

SONY®

VIDEO GRAPHIC PRINTER


UP-890CE

UP-890MD

SERVICE MANUAL

1st Edition (Revised 1)

SAFETY RELATED COMPONENT WARNING

Components identified by shading and  marked on the schematic diagrams and parts list are critical to safe operation. Replace these components with SONY parts whose part numbers appear as shown in this manual or in supplements published by SONY.

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SECTION 1 GENERAL

This section is extracted
from instruction manual.

1-1. SPECIFICATIONS

Thermal head

Thin-film thermal head (with built-in drive
IC) 1024-dot drive

Gradation

256

Resolution (in WIDE 1 mode)

EIA: 970 x 490 dots

CCIR: 970 x 582 dots

Print size (in NORM and WIDE 1 mode)

STD mode

EIA: 95 x 72 mm

CCIR: 95 x 71 mm

SIDE mode

EIA: 127 x 96 mm

CCIR: 127 x 95 mm

Printing speed (in STD and NORM mode)

About 3.9 seconds/screen (aspect ratio 4:3)

Picture memory

786 K x 6 bits

Input/output connectors

VIDEO IN (BNC)

EIA or CCIR

Composite video signals

1.0 Vp-p, 75 ohms/high-impedance (EIA/

CCIR automatically discriminated)

VIDEO OUT (BNC)

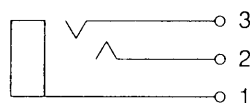
EIA or CCIR

Composite video signals

1.0 Vp-p, 75 ohms, loop-through/EE

switchable

REMOTE (stereo minijack)



1 GND

2 PRINT SIGNAL (TTL)

Input of LOW pulse over 100 msec.
initiates print.

3 PRINT BUSY (TTL)

Goes HIGH during printing.

Power requirements and consumption

120 V AC, 50/60 Hz, 1.5 A (UP-890MD)

220 to 240 V AC, 50/60 Hz, 0.8 A (UP-890CE)

Dimensions

Approx. 154 x 106 x 303 mm (w/h/d) (6 1/8 x
4 1/4 x 12 inches)

Mass

Approx. 3.5 kg (7 lb 11 oz), Main unit only

Supplied accessories

Paper roll (UPP-110HA) (1)

BNC – BNC connecting cable (1)

AC power cord (1)

Head cleaning sheet (1)

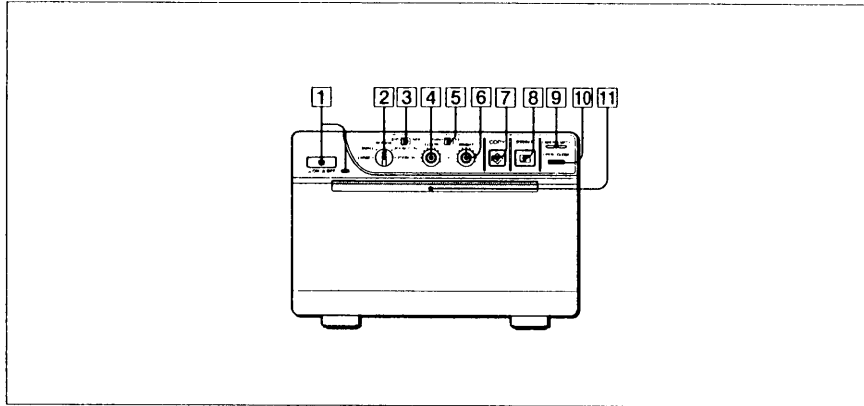
Remote commander RM-91 (1) supplied
with UP-890MD only

Design and specifications are subject to change
without notice.

1-2. LOCATION AND FUNCTION OF PARTS

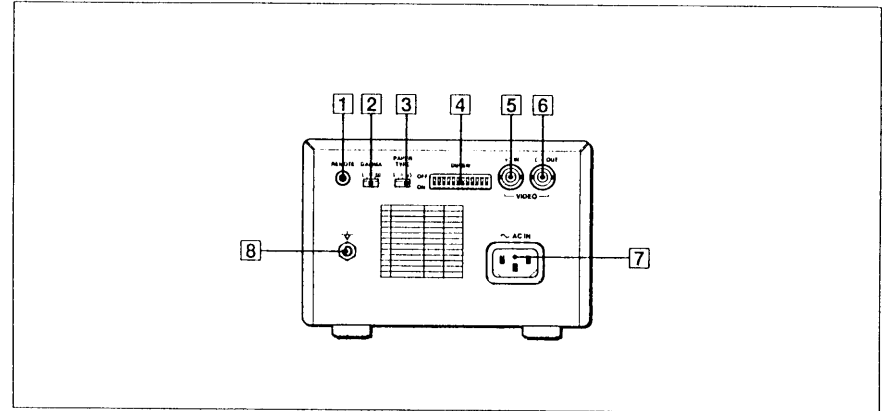
For details, refer to the pages indicated in parentheses.

Front



- 1 Power ON/OFF switch and indicator**
Turns the power on. The indicator is lit while the power is on.
- 2 Printing size selector (13)**
Selects the printing size.
- 3 STD (standard)/SIDE selector (13)**
Selects the printing direction.
- 4 CONTR (contrast) control (15)**
Adjusts the contrast of the print-outs.
- 5 THRU/EE selector (15)**
Selects the video signal output from the VIDEO OUT connector.
THRU: Input signals are directly output to the video monitor.
EE: Input signals are output to the video monitor after being processed by the printer's circuitry.
- 6 BRIGHT (brightness) control (15)**
Adjusts the brightness of the print-outs.
- 7 COPY button (14)**
Prints another copy of the previous print-out.
- 8 PRINT button (12)**
Prints the picture currently displayed on the video monitor. The picture displayed when you press the PRINT button is stored in memory.
- 9 PAPER EMPTY indicator**
Lights when the printer is out of paper.
- 10 OPEN/CLOSE button (10, 14)**
Opens or closes the door. Also, stops printing midway.
- 11 Paper feeder and cutter**
Cuts the printing paper.

Back



- 1 REMOTE connector (5)**
Connect the RM-91 remote commander for controlling print operation from a distance. The RM-91 remote commander is supplied with UP-890MD only.
- 2 GAMMA selector (6)**
Changes the print mode to that for high-density printing paper. The selector is effective when the PAPER TYPE selector is set to II or IV.
- 3 PAPER TYPE selector (6)**
Sets the type of paper.
- 4 DIP SW (switches) (7 - 9)**
Sets the print modes and functions.
- 5 VIDEO IN (input) connector (BNC type) (5)**
Connect to the video output connector of the video equipment.
- 6 VIDEO OUT (output) connector (BNC type) (5)**
Connect to the video input connector of the video monitor. The output signal type depends on the setting of the THRU/EE selector.
- 7 AC IN (AC power input) connector (5)**
Connect to a wall outlet using the supplied AC power cord.
- 8 Equipotential terminal**
Equipped only with the UP-890CE/890MD.

1-3. OVERVIEW

The UP-880/890CE/890MD is a black and white video graphic printer that can be used to print images displayed on video monitor.

Clear, consistent print quality

- High definition, 10.2 dots/mm printing using a thermal head with high-speed drive IC.
- 256 gradations of black and white.

Fast printing

- You can make a single print-out in about 3.9 seconds in STD and NORM mode.
- You can make a maximum of 11 copies of the same image continuously.

Two way printing direction and five printing sizes selectable

- The printing direction selector on the front panel enables you to print in vertical and horizontal directions.
- The printing size control on the front panel enables you to select five kinds of printing size.

DIP switches to optimize the printer

- You can make print-outs starting either from the bottom or top of the image by setting the DIRECTION DIP switch.
- You can set the print-out aspect ratio to 4:3 or 1:1 by setting the ASPECT DIP switch.
- You can set the range to be printed by setting the SCAN DIP switch.
- You can save your paper by setting the POSTFEED DIP switch (paper saving function).

Automatic video signal discrimination

The type of input signal, black and white (EIA or CCIR) or input color (NTSC or PAL), is automatically discriminated and printed in same duration and size.

Alarm buzzer

The alarm buzzer prevents you from making any misoperation.

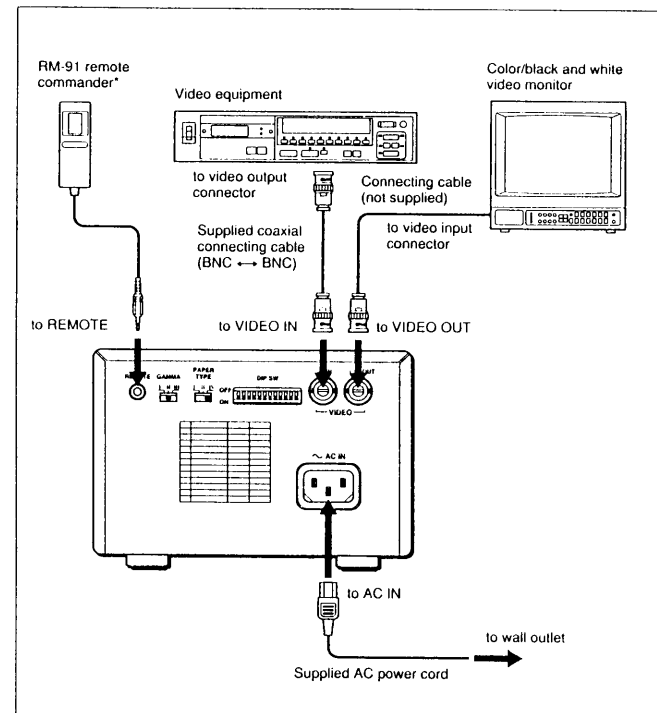
Easy and quick paper loading

You can load paper just by opening the paper lid with the OPEN/CLOSE button and placing the paper roll.

1-4. CONNECTION

Notes

- Turn off the power to each device before making connection.
- Connect the AC power cord last.



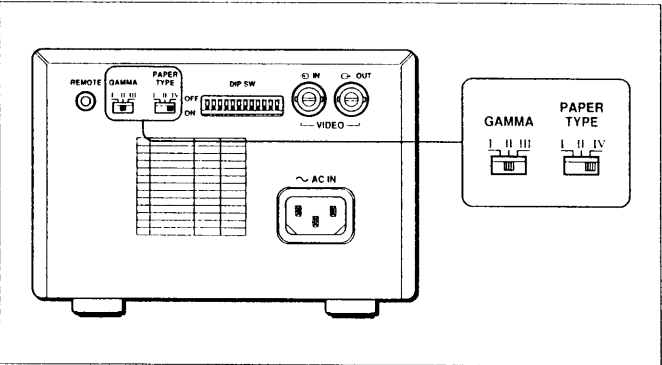
* The RM-91 remote commander is supplied with UP-890MD only.

1-5. BEFORE PRINTING

Setting the Type of Paper

Set the PAPER TYPE selector to the type of paper to be used.
The use of paper other than Sony may result in reduced printer performance and poor print quality.

Type of paper	PAPER TYPE switch position
UPP-110S	I (Normal)
UPP-110HD	II (High density)
UPP-110HA	IV (Enhanced)

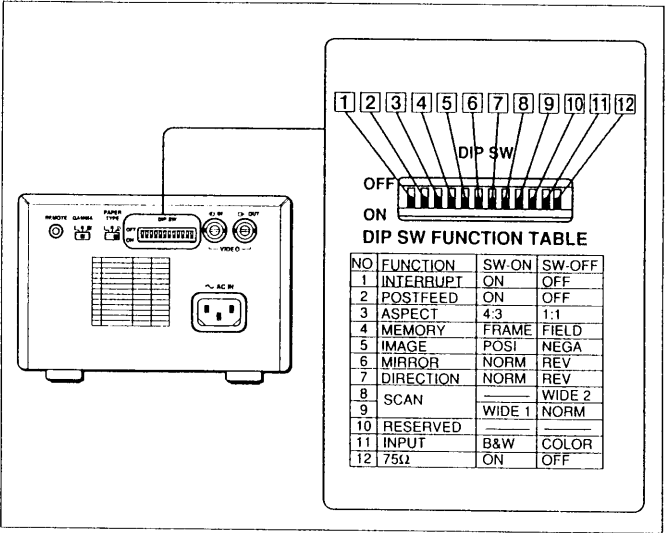


When you use the UPP-110HA or UPP-110HD

When you set the PAPER TYPE selector to II or IV, set the density gradation with the GAMMA selector.
I: Soft gradation
II: Standard
IV: Hard gradation

Setting the DIP Switches

Set the DIP switches according to the required print mode. Before setting the DIP switches, turn the power off. Change the settings using a small pointed tool such as a small screwdriver. The factory settings are as follows.

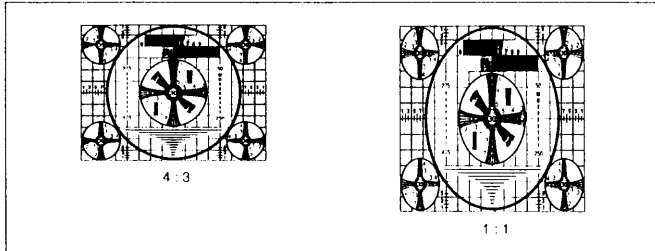


- 1 INTERRUPT ON/OFF switch**
To interrupt the printing under way and print a new picture when you press the PRINT button during printing, set this switch to ON.
To disregard that the PRINT button is pressed during printing and continue the printing under way, set to OFF.
If you press the PRINT button during printing in OFF mode, the alarm buzzer will sound.
- 2 POSTFEED ON/OFF switch**
To feed out extra blank paper once a picture has been printed, set this switch to ON.
To save paper by feeding only a short length of paper after printing a picture, set to OFF. You can make more print-outs per roll of printing paper, but you have to take out and cut the paper yourself.

[3] ASPECT 4:3/1:1 switch

Normally keep this switch set to 4:3. When the aspect ratio of the video signal is 1:1, set to 1:1.

The print-out will be longer than a print-out made at 4:3.



[4] MEMORY FRAME/FIELD switch

Normally keep this switch set to FRAME (ON). When printing fast-moving pictures (such as a ball being thrown), the print-out may blur. If this happens, set to FIELD. The print-out definition will be poorer but less blurred.

[5] IMAGE POSI/NEGA switch

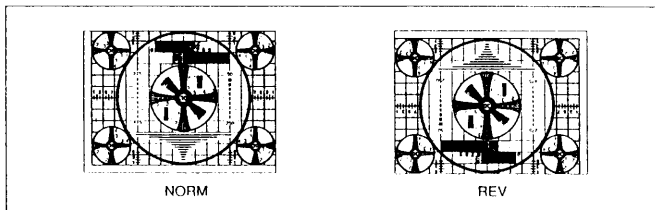
Normally keep this switch set to POSI (ON). To make negative print-outs, set to NEGA (OFF).

[6] MIRROR NORM/REV switch

Normally keep this switch set to NORM (ON). To print the right and left sides reversed, set to REV (OFF).

[7] DIRECTION NORM/REV switch

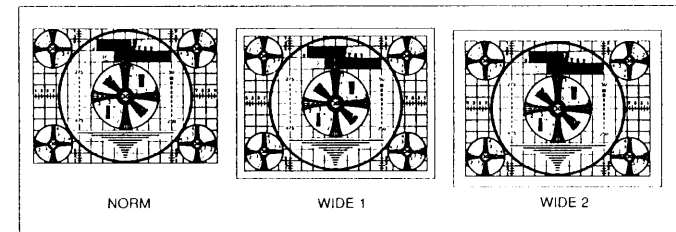
Selects whether the top or bottom of the screen is to be printed first. Normally keep this switch set to NORM (ON). Printing is done from the bottom of the screen. To start printing from the top of the screen, set to REV (OFF).



[8] [9] SCAN NORM/WIDE 1/WIDE 2 switch

Sets the print-out range. The print-out range is widened in the NORM, WIDE 1, and WIDE 2 order.

To print only the image displayed on the standard screen size of the video monitor, set the SCAN switch [9] to NORM (OFF). To print when the signal scans beyond the edge of the standard monitor screen, set the SCAN switch [9] to WIDE 1 (ON) or the SCAN switch [8] to WIDE 2 (OFF). When you set the SCAN switch [8] to the WIDE 2 position, WIDE 2 is selected regardless of the setting of the SCAN switch [9] position.



[10] RESERVED switch

Keep this switch set to ON.

[11] INPUT B&W/COLOR switch

Set this switch to B & W (ON) when the signal to be printed is black and white. Set to COLOR (OFF) when the signal is color.

[12] 75Ω ON/OFF switch

Set this switch to OFF when a video monitor or other video equipment is connected to the VIDEO OUT connector.

Set to ON when nothing is connected to the VIDEO OUT connector.

When you connect two printers to one video equipment, set the 75Ω switch of one of the printer to ON, and the other to OFF.

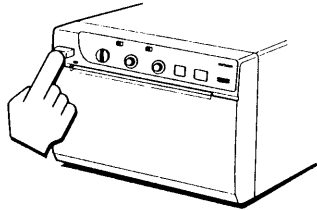
1-6. LOADING PAPER

Notes

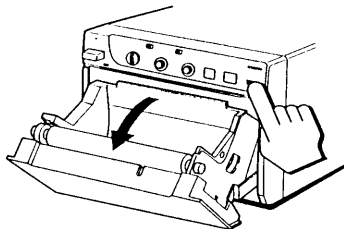
- Do not fold the paper or touch the printing surface. Dust on the printing surface will result in poor print quality.
- After loading the paper roll, pull out and cut off the first 15 to 20 cm (6 to 7½ inches) to remove any slack.
- Use only UPP-110 series paper (p. 19).
- Set the PAPER TYPE selector according to the paper type (p. 6).

Loading

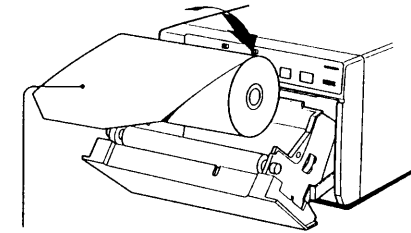
- 1 Press the power ON/OFF switch to turn on the printer.



- 2 Press the OPEN/CLOSE button to open the paper lid.

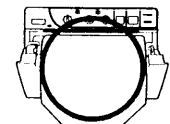
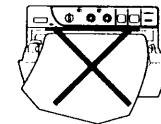
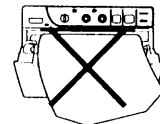
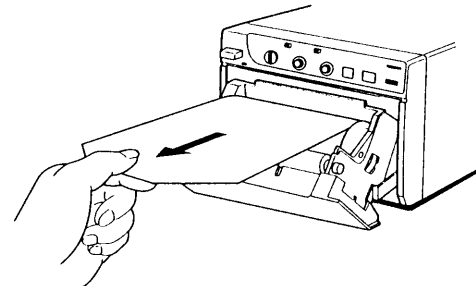


- 3 Place the paper roll in the printer.

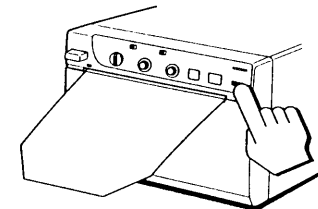


Place the paper with the thermo-sensitive side (printing side) up.

- 4 Pull out the first 15 to 20 cm (6 to 7½ inches) of the paper to remove any slack in the roll.



- 5 Press the OPEN/CLOSE button to close the paper lid. You can also close the paper lid simply by pushing it.



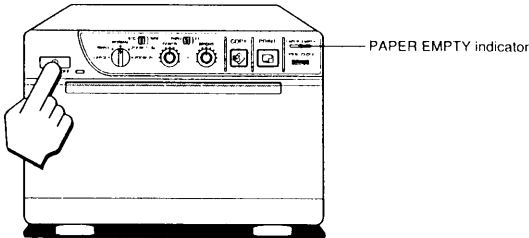
1-7. PRINTING

Before making print-outs

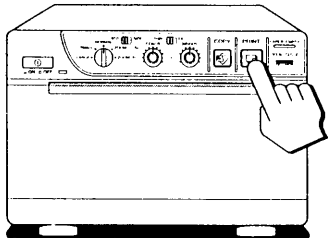
- Are the connections correct? (p. 5)
- Is the paper roll loaded properly? (p. 10).
- Is the paper type set correctly? (p. 6).
- Are the DIP switches set correctly? (p. 7 – 9)
- Is the print source being input?

Making Print-outs

- 1 Press the power ON/OFF switch to turn on the printer.
The power indicator lights.

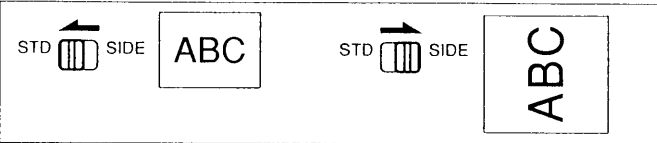


- 2 Make sure that the PAPER EMPTY indicator is not lit.
If lit, load paper.
- 3 Select the printing direction and size.
See “Selecting the Printing Direction” and “Selecting the Printing Size” on the next page.
- 4 When the picture you want to print is on the video monitor, press the PRINT button.
The printer makes a print-out of the picture displayed at the instant you press the PRINT button.



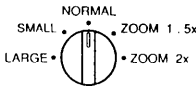
Selecting the printing direction

You can select the vertical or horizontal direction using the STD/SIDE selector.
To print in the vertical direction, set to STD.
To print in the horizontal direction, set to SIDE.



Selecting the printing size

You can print in small or large size.
Also you can enlarge the center of the picture by 1.5 or 2 times.



Control position (mode)	Printing size	
	Vertical (STD)	Horizontal (SIDE)
NORMAL		
SMALL		
LARGE		
ZOOM 1.5X		
ZOOM 2X		

To print in SMALL mode

Press the PRINT button twice. When you press the PRINT button once, the buzzer sounds. The printer starts printing after the PRINT button is pressed twice.

Stopping printing midway

Press the OPEN/CLOSE button while printing or while copying. The printer stops printing.

To stop printing and print another picture displayed on the video monitor

To do this, the DIP switch **1** (INTERRUPT) must be set to ON (p. 7). Press the PRINT button while printing or copying. The printer stops printing and starts printing the picture displayed at the instant you press the PRINT button.

Making copies of the last print-out

Press the COPY button. The printer makes a copy of the last print-out. The last print-out is retained in the printer's memory until you press the PRINT button again or turn the power off.

To copy in different sizes

You can copy the last print-out in different sizes. Before pressing the COPY button, select the printing size as described in "Selecting the Printing Size".

Notes

- If you press the COPY button immediately after turning the power on, the alarm buzzer will sound as nothing is stored in memory.
- In SMALL mode (p. 13), if you press the COPY button after you have pressed the PRINT button only once, the alarm buzzer will sound and the printer will not copy.

To make multiple copies of the same print-out

Press the COPY button as many times as necessary (maximum 11 copies including the first print-out) while printing or copying the first print-out. Each time you press the COPY button, the short buzzer sounds.

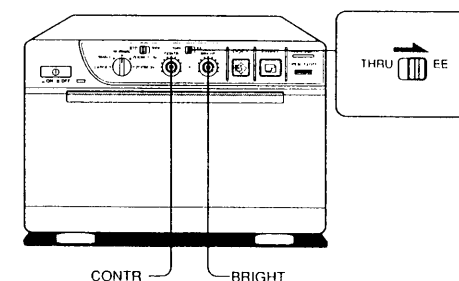
To stop copying midway

Press the OPEN/CLOSE button.

Adjusting the Contrast and Brightness

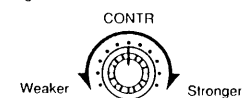
You can adjust the contrast and brightness of the print-out.

- 1 Set the THRU/EE selector to EE.
You can check the adjusted picture on the video monitor.

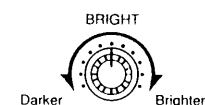


- 2 Adjust the brightness with the BRIGHT control and the contrast with the CONTR control while watching the picture on the video monitor.

Adjusting the contrast



Adjusting the brightness



To directly input the video signal from the video equipment, which is connected to the printer, to the video monitor

Set the THRU/EE selector to THRU. The video signal is directly input to the video monitor without being processed by the printer's circuitry.

1-8. PRECAUTIONS

On the safety

- Check the operating voltage before operation.
Operate the unit only with a power source specified in "Specifications".
- Stop operation immediately if any liquid or solid object falls into the cabinet.
Unplug the unit and have it checked by qualified personnel.
- Unplug the unit from a wall outlet if you will not be using it for a long time.
Disconnect the power cord by grasping the plug. Never pull the cord itself.
- Do not disassemble the cabinet. Refer servicing to qualified personnel only.
- Do not touch the cutting blade of the printer.
- Connect the power plug of the printer to a wall outlet having protective earth terminal. The safety earth should be properly established.

On operation

Do not turn the power off while the printer is printing. The thermal head may be damaged.

On printer carriage

Do not carry and move the printer when the paper roll is placed in the printer. Doing so may cause malfunction.

On installation

- Place the printer on a level and stable surface during operation.
- Do not install the printer near heat sources. Avoid locations near radiators or air ducts, or place subject to direct sunlight or excessive dust, humidity, mechanical shock or vibration.
- Provide adequate air circulation to prevent heat build-up. Do not place the printer on surfaces such as rugs, blankets, etc., or near materials such as curtains and draperies.

Maintenance

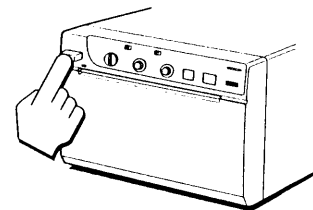
Cleaning the cabinet

Do not use strong solvents to clean the printer. Thinner or abrasive cleansers will damage the cabinet.

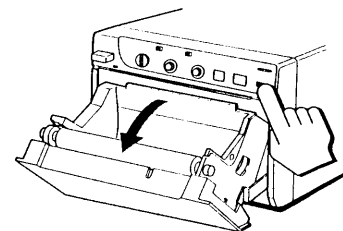
Cleaning the thermal head

If the print-out is dirty or white stripes appear on the print-outs, clean the thermal head using the supplied cleaning sheet.

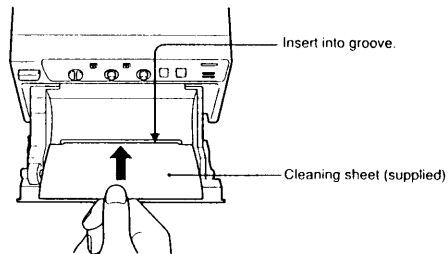
- 1 Press the power ON/OFF switch to turn on the printer.



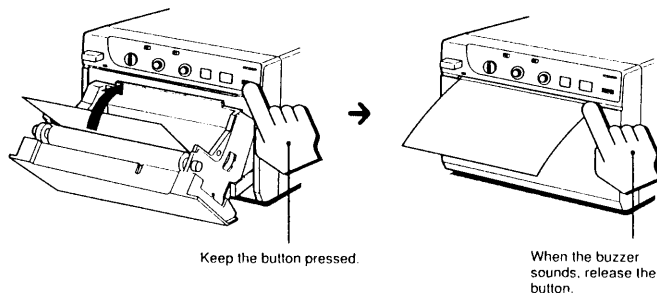
- 2 Press the OPEN/CLOSE button to open the paper lid.



- 3 Insert the cleaning sheet, with the black surface facing down, into the groove in the paper lid.



- 4 Press the OPEN/CLOSE button and keep it pressed. The paper lid closes and the printer starts cleaning the head. When the buzzer sounds and the printer starts ejecting the cleaning sheet, release the OPEN/CLOSE button.



- 5 Remove the cleaning sheet.

Notes

- Do not press the PRINT or COPY button while the cleaning sheet is in the printer.
- Clean the head only when necessary. If you clean the head too often, it may cause malfunction.

1-9. ON THE TYPE OF PAPER

Type of paper

- Use only the Sony UPP-110 series paper. The use of other paper may result in reduced printer performance and poor print quality.
- The following types of paper are available.

Printing density	Type of paper
TYPE I (Normal)	UPP-110S
TYPE II (High density)	UPP-110HD
TYPE IV (Enhanced)	UPP-110HA

Storing paper

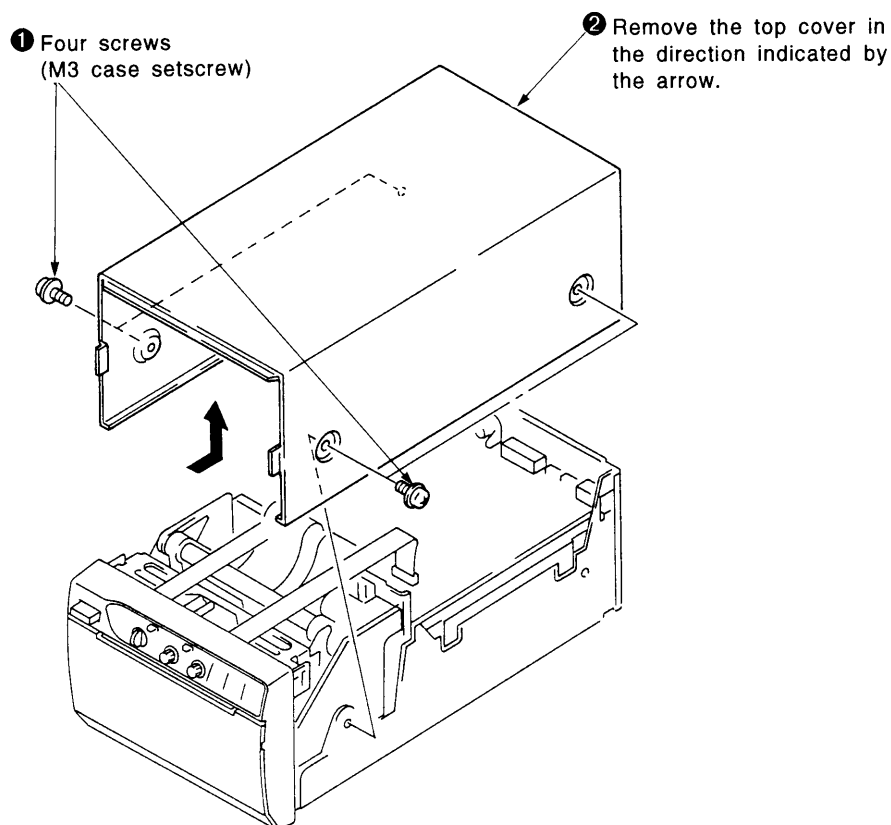
- Store unused or printed paper in a cool, dark place (below 30°C or 86°F). We recommend that you store printed paper in a polypropylene pouch.
- Do not store unused or printed paper in hot or humid place.
- Do not leave unused or printed paper in direct sunlight or other bright place for extended periods.
- Do not allow any volatile organic solvent or vinyl chloride to touch the printed paper. Alcohol, plastic tape or film will fade the print-out.
- To attach printed paper to another piece of paper, use double-sided adhesive tape, or water-based or solid glue.
- Do not stack printed paper on or under a diazo copy sheet. The print-out may become discolor in black.

1-10. TROUBLESHOOTING

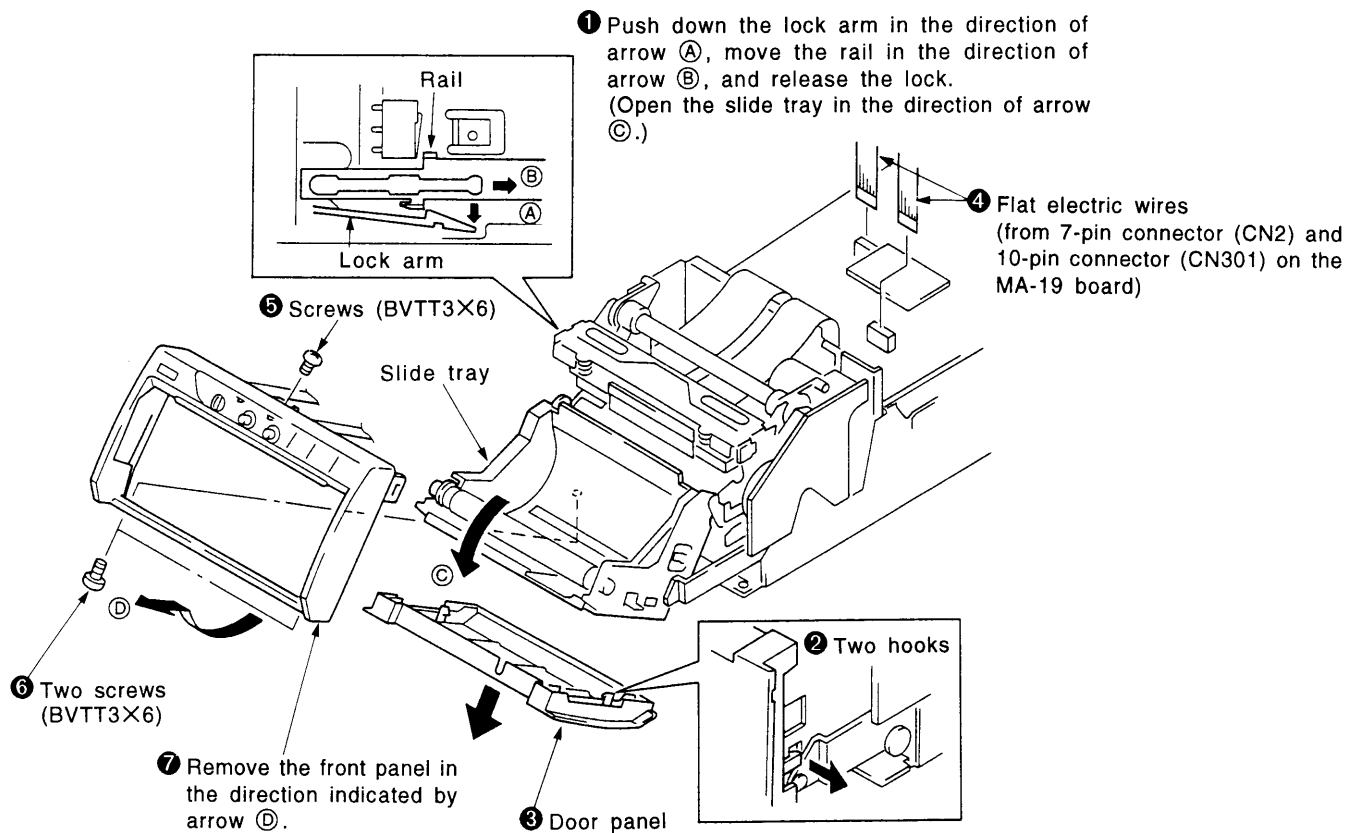
Symptom	Cause/remedy
White specks on first few print-outs.	When printing with a newly inserted roll of paper, dust on the surface of the paper may cause white specks on the print-outs. → Feed the paper by pressing the OPEN/CLOSE button until clean paper appears.
Printing does not start when you press the PRINT button.	<ul style="list-style-type: none"> Paper is not fed. → Is the paper slack? → Is the power turned on? → Are all connections correct? (p. 5) → Did you press the PRINT button twice in SMALL mode? When the alarm buzzer sounds: → Has the thermal head overheated? → Is the video signal of the picture input? → Is the paper loaded correctly? Paper is fed, but printing does not start. → Is the paper loaded with the thermo-sensitive side up?
Black borders or missing portions around the print-out.	This may result according to the video signal input to the printer. → Change the setting of the SCAN switches (DIP switches [8], [9]). (p. 9)
Paper jam	<ul style="list-style-type: none"> Open the paper lid by pressing the OPEN/CLOSE button, then pull the jammed paper slowly and remove it. There is condensation within the unit. → Moving the unit suddenly from a cold place to a warm place often results in condensation forming. In the event of condensation forming, remove the paper, turn off the power and leave the unit for about one to two hours.
Print-out is dirty.	The thermal head is dirty. → Clean the thermal head with the supplied head cleaning sheet. (p. 17)
The printer stops printing when it prints continuously black pictures.	This is likely to occur when the printer prints continuously 15 or more black pictures. In such a case, the buzzer sounds. This is because that the protective circuit works against heat build-up of the thermal head. Stop printing for a while.
White lines or small letters on the screen are not printed clearly.	Is the INPUT switch (DIP SWITCH [11]) set to B & W when the input signal is a black and white signal? (p. 9)
Small squares appear over the whole screen.	Is the INPUT switch (DIP switch [11]) set to COLOR when the input signal is a color signal? (p. 9)
The print-out is too dark or too light.	<ul style="list-style-type: none"> Is the 75Ω switch (DIP switch [12]) set correctly? (p. 9) Is the GAMMA selector set correctly? (p. 6)
The print-out seems stretched.	The ASPECT switch (DIP switch [3]) is set to 1:1. → Set to 4:3. (p. 8)

SECTION 2 DISASSEMBLY

2-1. REMOVING THE TOP COVER



2-2. REMOVING THE DOOR PANEL AND FRONT PANEL UNIT



2-3. REMOVING THE MA-19 BOARD

- ① Disconnect the nine connectors.
(CN51, CN101, CN102, CN201,
CN202, CN303, CN304, CN305,
and CN306)

- ⑤ Four screws
(screw M3 with tooth W)

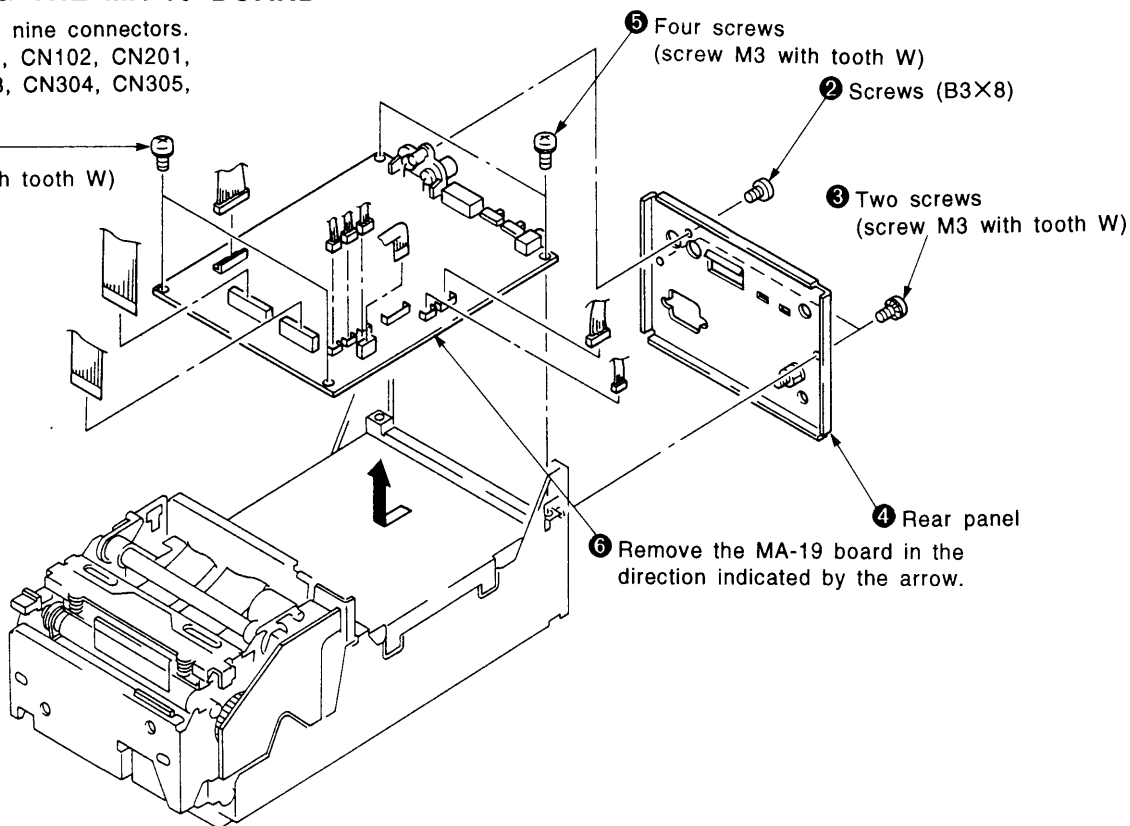
- ⑤ Four screws
(screw M3 with tooth W)

- ② Screws (B3×8)

- ③ Two screws
(screw M3 with tooth W)

- ④ Rear panel

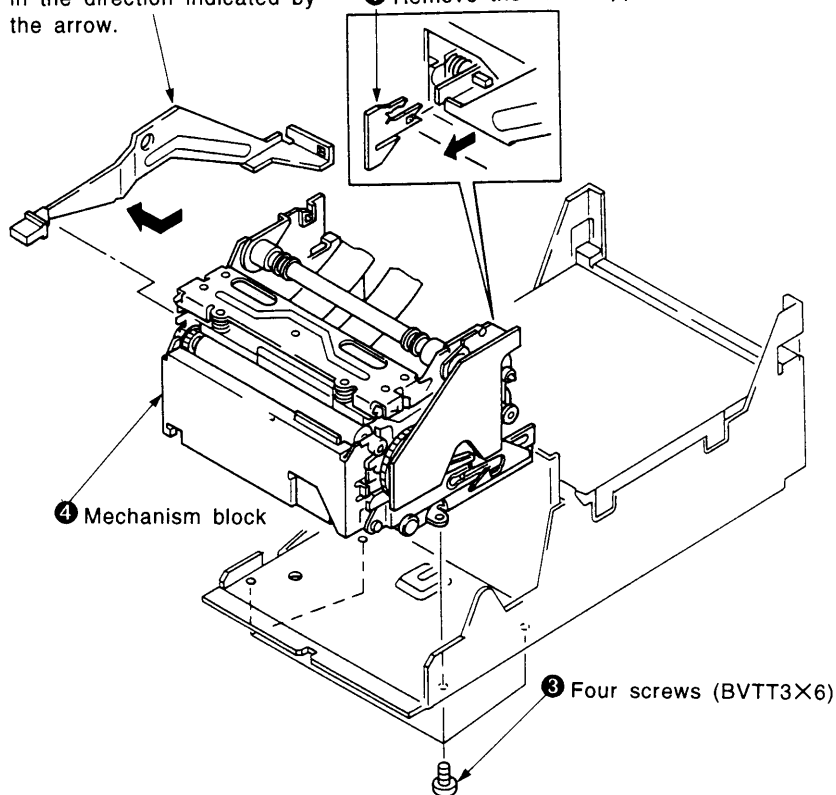
- ⑥ Remove the MA-19 board in the
direction indicated by the arrow.



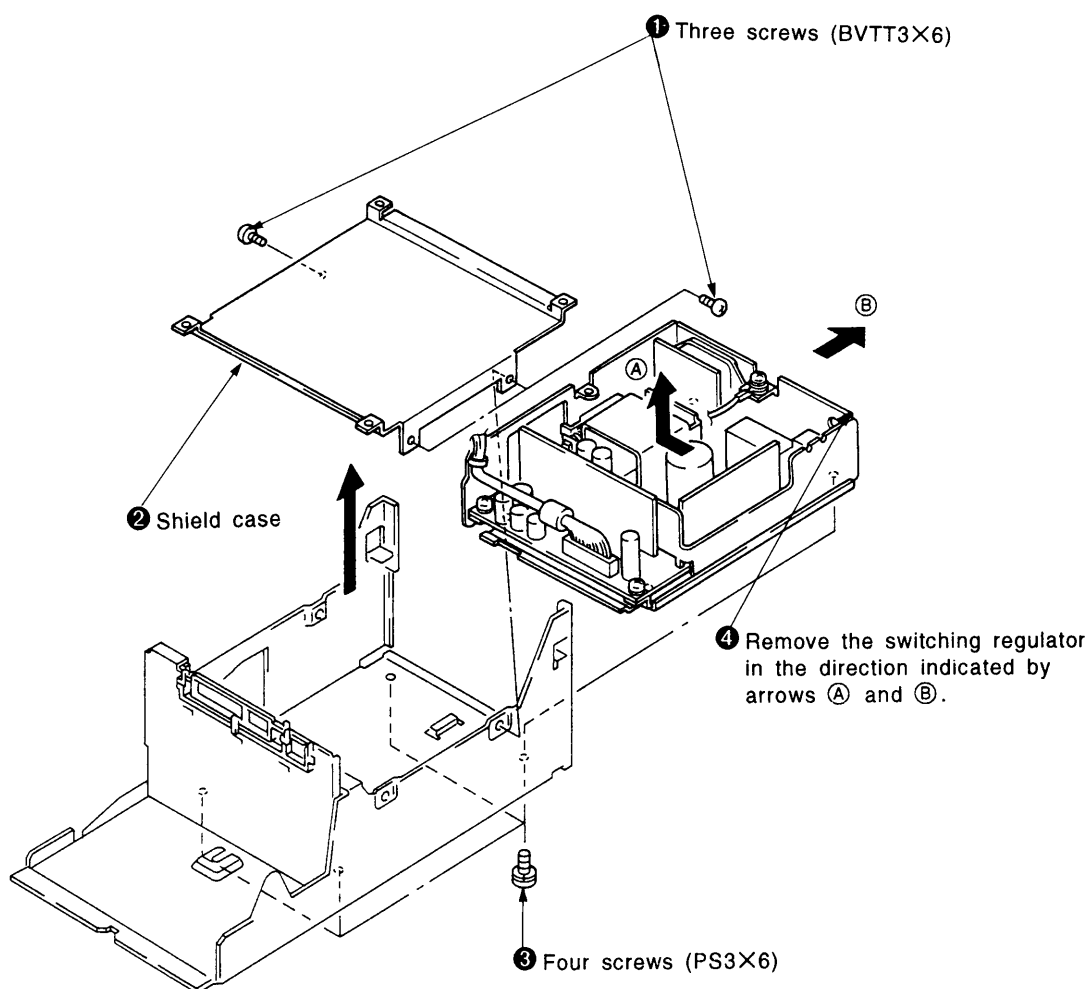
2-4. REMOVING THE MECHANISM BLOCK

- ② Remove the power switch rod
in the direction indicated by
the arrow.

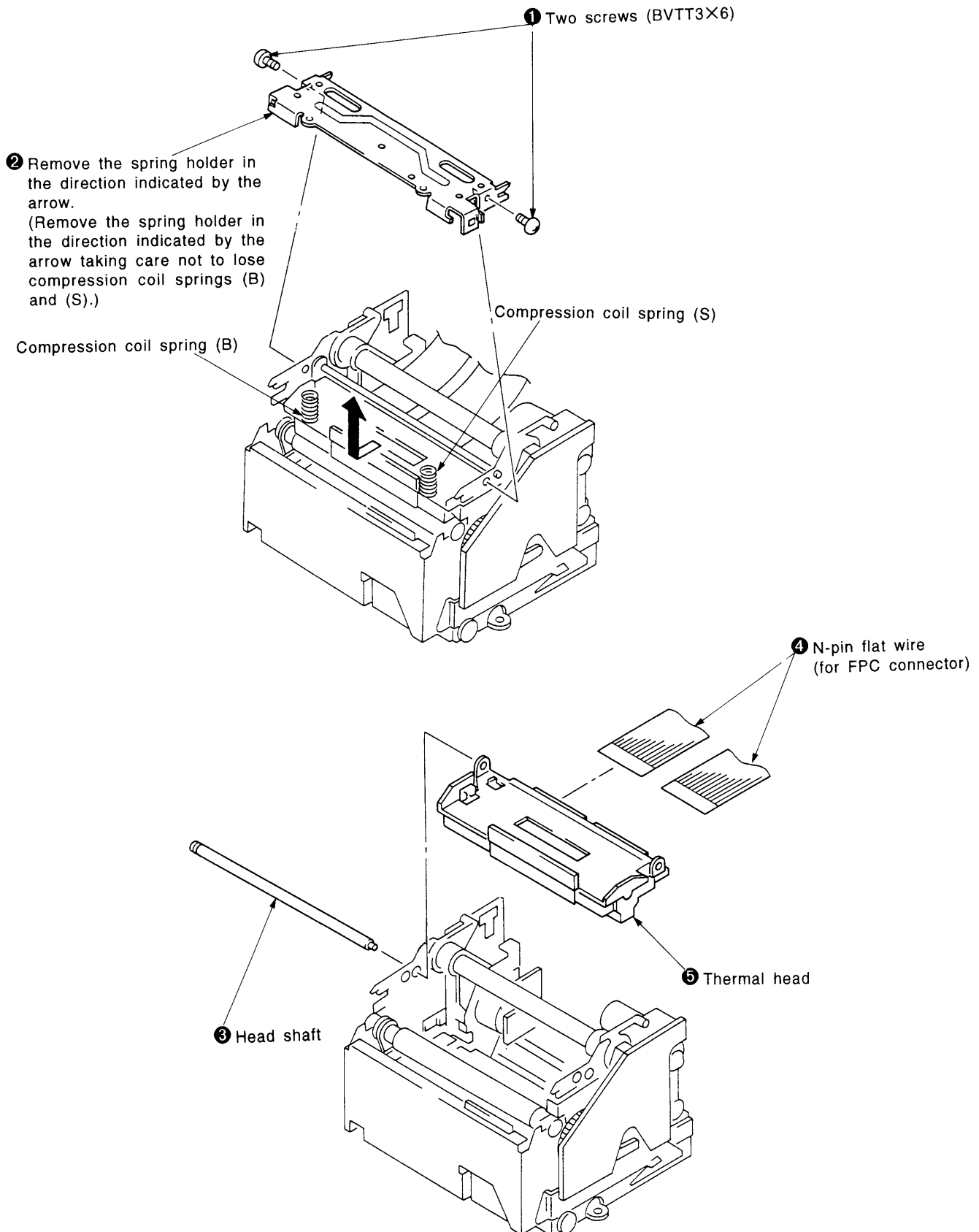
- ① Remove the rod stopper.



2-5. REMOVING THE SHIELD CASE AND SWITCHING REGULATOR



2-6. REMOVING THE THERMAL HEAD

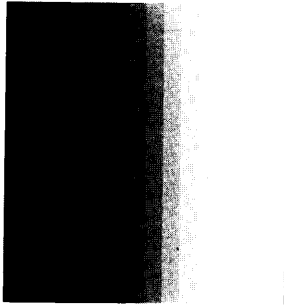
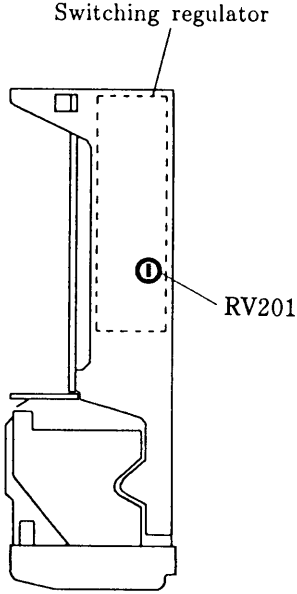


SECTION 3 ADJUSTMENTS

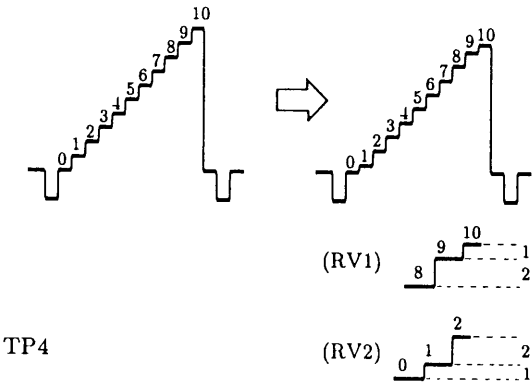
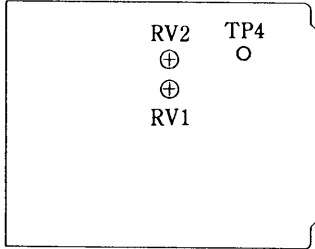
Measuring Equipment Required

1. Oscilloscope
2. Frequency counter
3. Color-bar pattern generator (1410 : NTSC and 1411 : PAL signal generator)
4. Digital multimeter

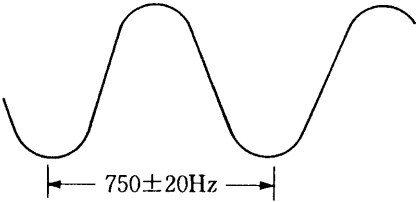
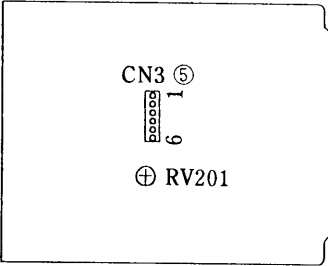
3-1. HEAD VOLTAGE ADJUSTMENT

Conditions for adjustment	Specification	Adjustment
<ul style="list-style-type: none"> Input signal : NTSC or PAL signal (1410 or 1411 signal generator) Turn on the POWER switch while pressing the PRINT and COPY buttons at the same time. <p>Note :</p> <ul style="list-style-type: none"> Do not release the switch until the buzzer sounds. For printing-out, press the PRINT button. Set DIP switches 1 through 12 to ON (lower position), and set DIP switch 1 to OFF. Use the UPP-110HA paper. Adjust the paper-type slide switch to the right edge (IV). 	 <p style="text-align: center;">Fig. 1</p> <p>Adjust RV201 to make the 17-step gradation signal smooth as shown in Fig. 1.</p>	<p>● RV901</p>  <p style="text-align: right;">Switching regulator</p> <p style="text-align: right;">RV201</p>

3-2. BRIGHTNESS CONTRAST ADJUSTMENT

Conditions for adjustment	Specification	Adjustment
<ul style="list-style-type: none"> Input signal : 10-step signal (1410 or 1411 signal generator) Set the CONTR and BRT control knobs to the center position. 	 <p style="text-align: center;">TP4</p> <p style="text-align: center;">(RV1)</p> <p style="text-align: center;">(RV2)</p>	<p>● RV1/C-2 (MA-19)</p> <p>● RV1/C-2 (MA-19)</p>  <p style="text-align: right;">RV2 TP4</p> <p style="text-align: right;">⊕ ○</p> <p style="text-align: right;">⊕</p> <p style="text-align: right;">RV1</p>

3-3. MOTOR SPEED ADJUSTMENT

Conditions for adjustment	Specification	Adjustment
<div>· Input signal : Color-bar (1410 or 1411 signal generator)</div> <div>· Press the PRINT button to measure the waveform at pin ⑤ of connector CN3.</div> <div>· Set DIP switches 1 through 12 to ON (lower position).</div> <div>· Use the UPP-110HA paper.</div> <div>Note :</div> <div>Do not adjust while a print blank strip is fed.</div>	<div></div> <div>CN3 ⑤</div>	<div>● RV201/C-3 (MA-19)</div> <div></div>

BLOCK DIAGRAMS

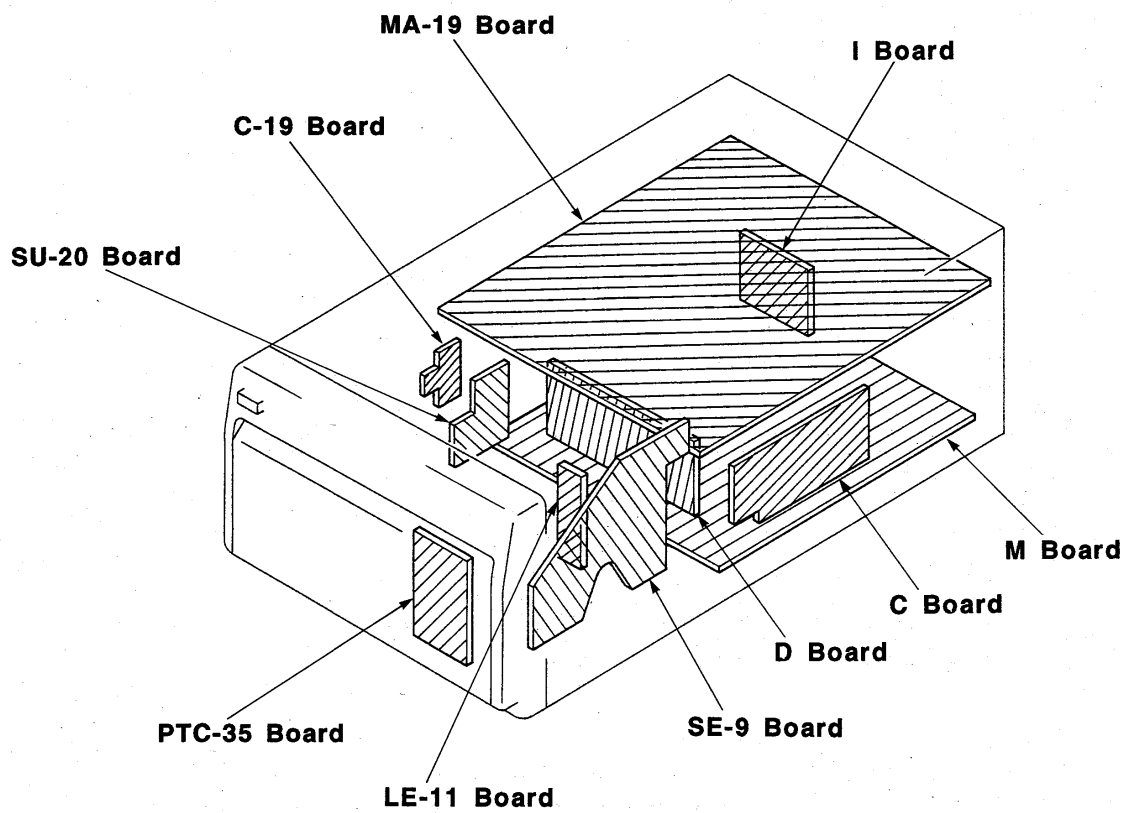
BLOCK DIAGRAMS

The following diagram has been divided into 3 sections as noted on the grid shown below.

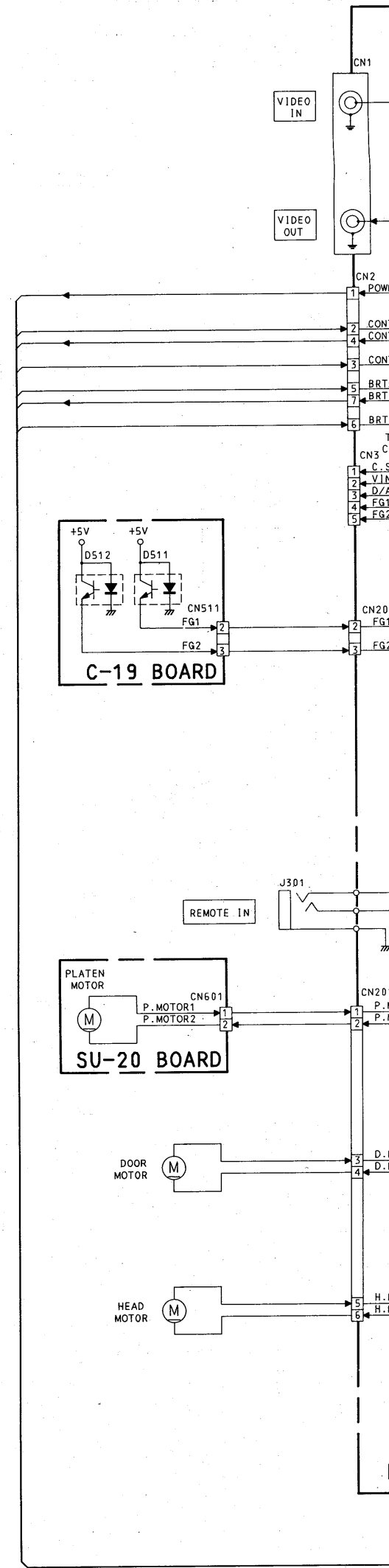
A1	A2	A3
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SECTION 4
DIAGRAMS

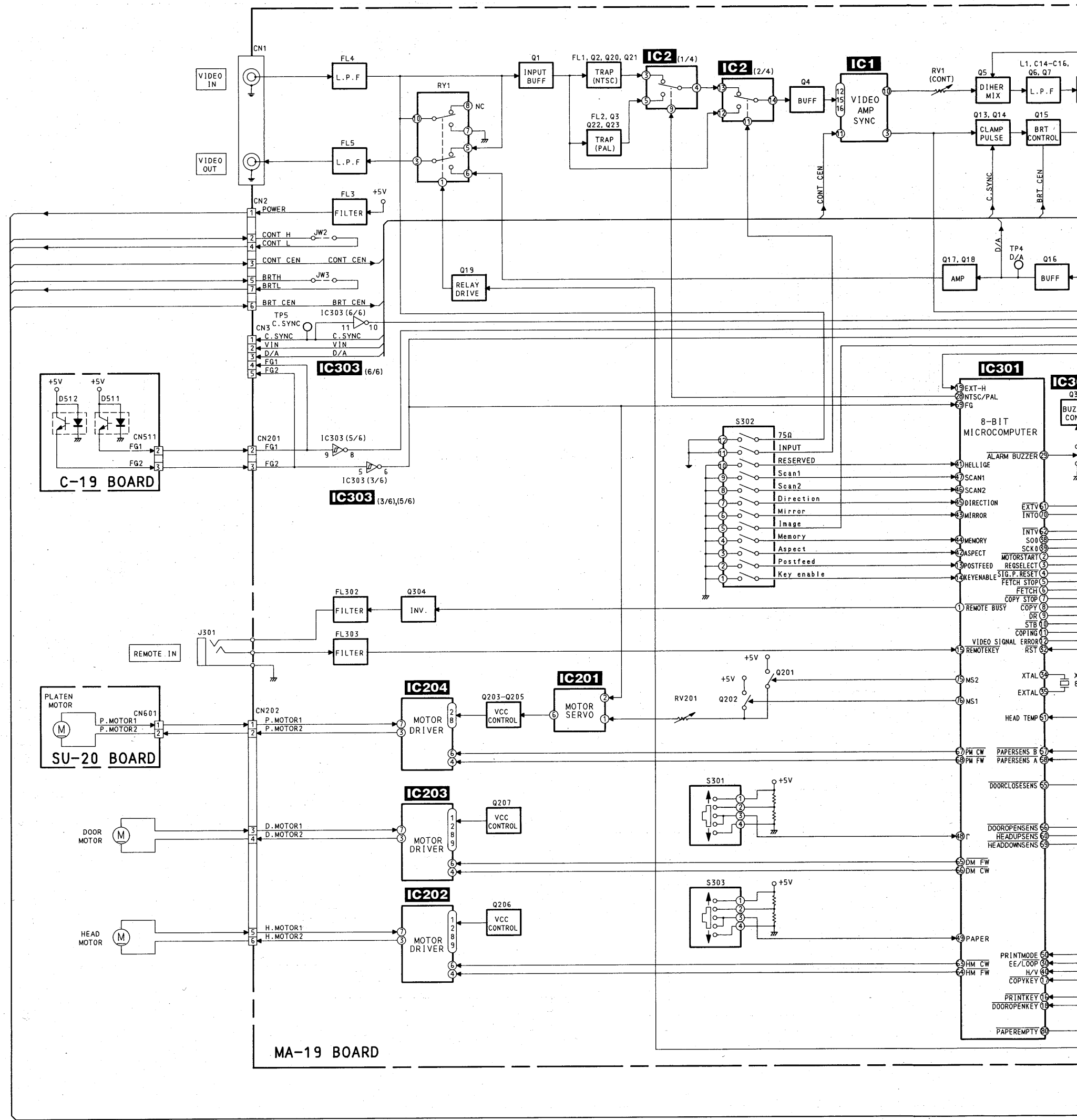
4-1. CIRCUIT BOARDS LOCATION

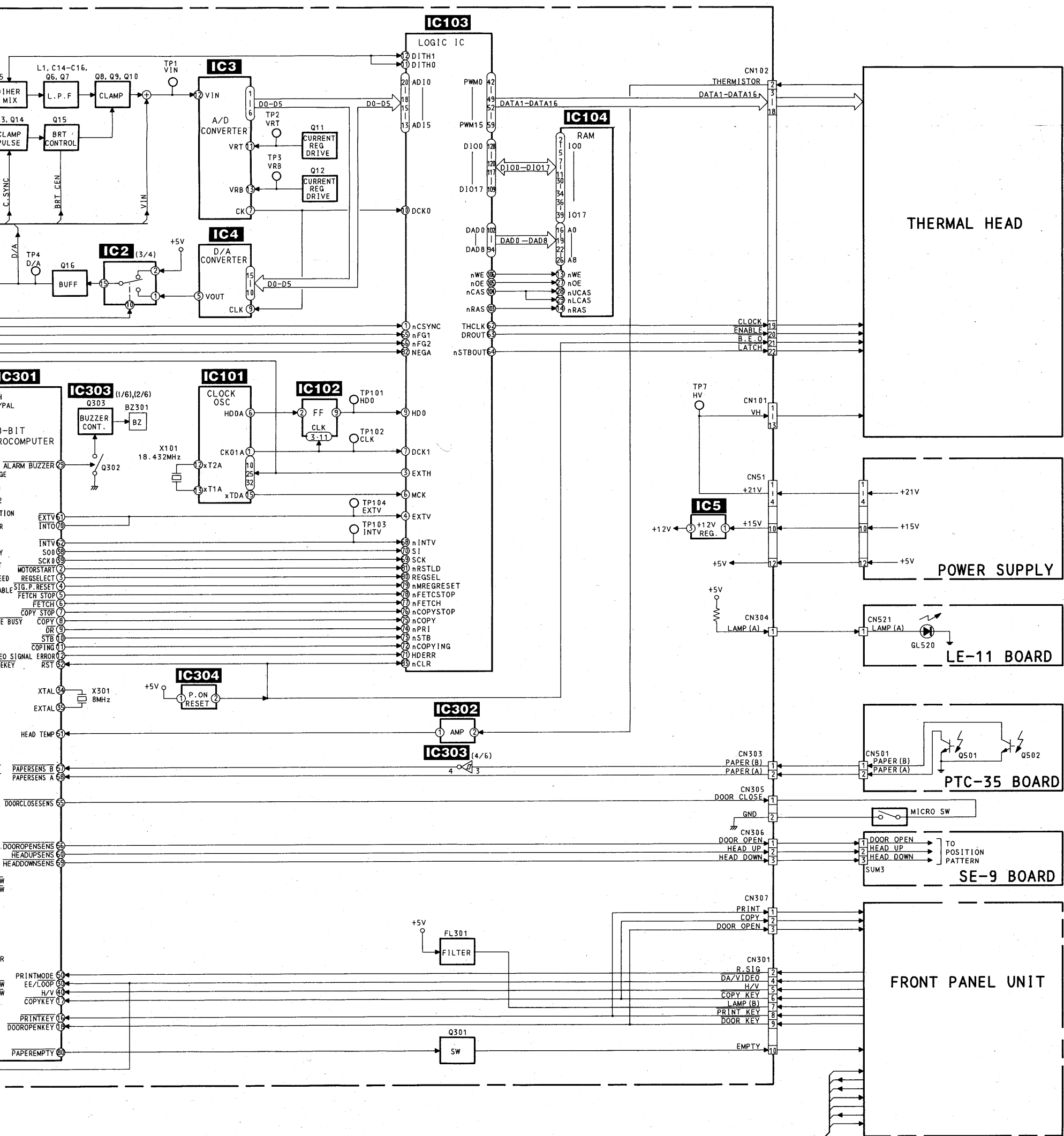


4-2. BLOCK DIAGRAM



4-2. BLOCK DIAGRAM





PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

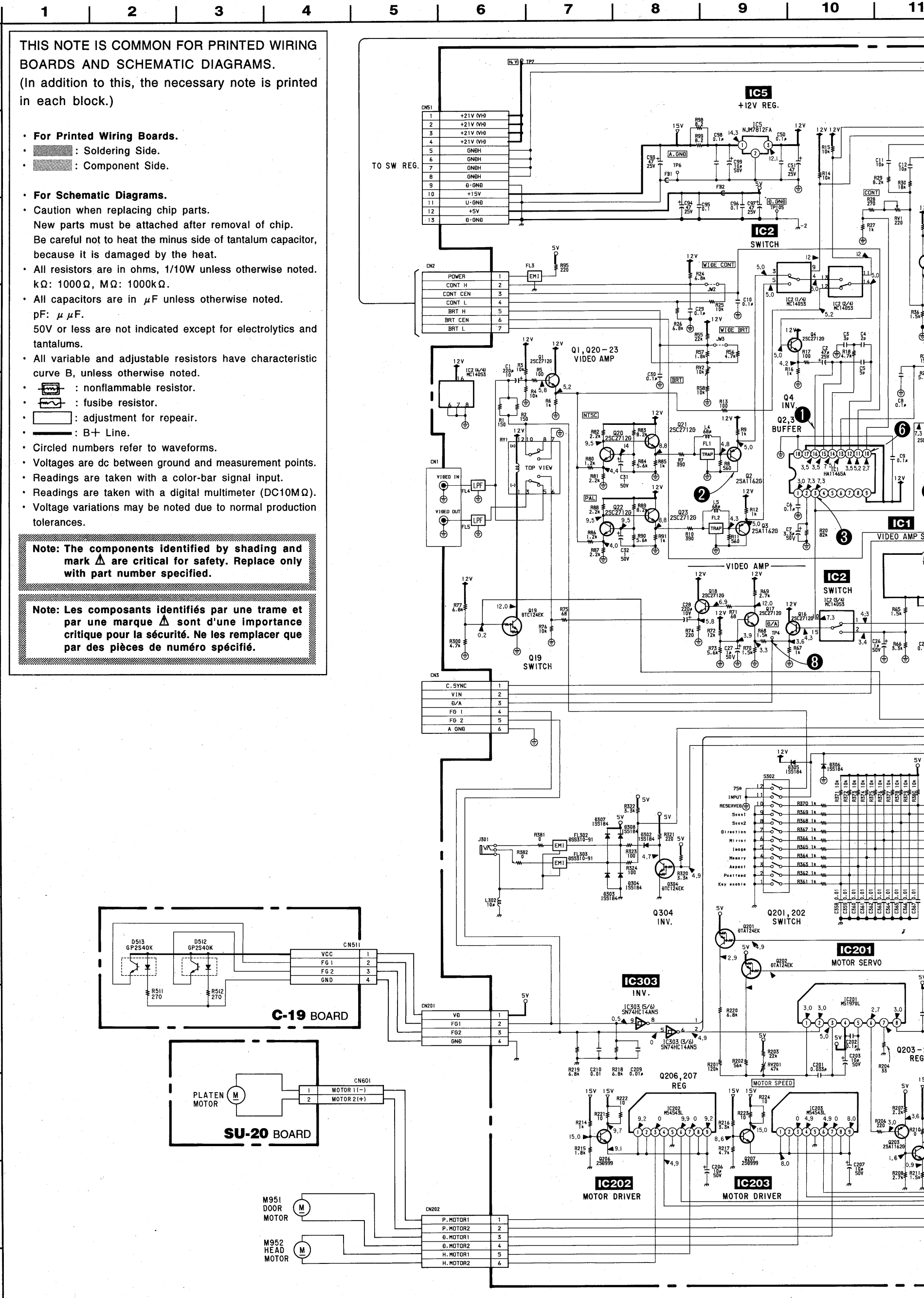
PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

The following diagram has been devided into 3 sections as noted on the grid shown below.

A1	A2	A3
----	----	----

4-3. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

MA-19 (MEMORY CONTROL, VIDEO, SYNC) SE-9 (POS. SENSOR) PTC-35 (PAPER SENSOR) SU-20 (PLATEN MOTOR) LE-11 (LAMP) C-

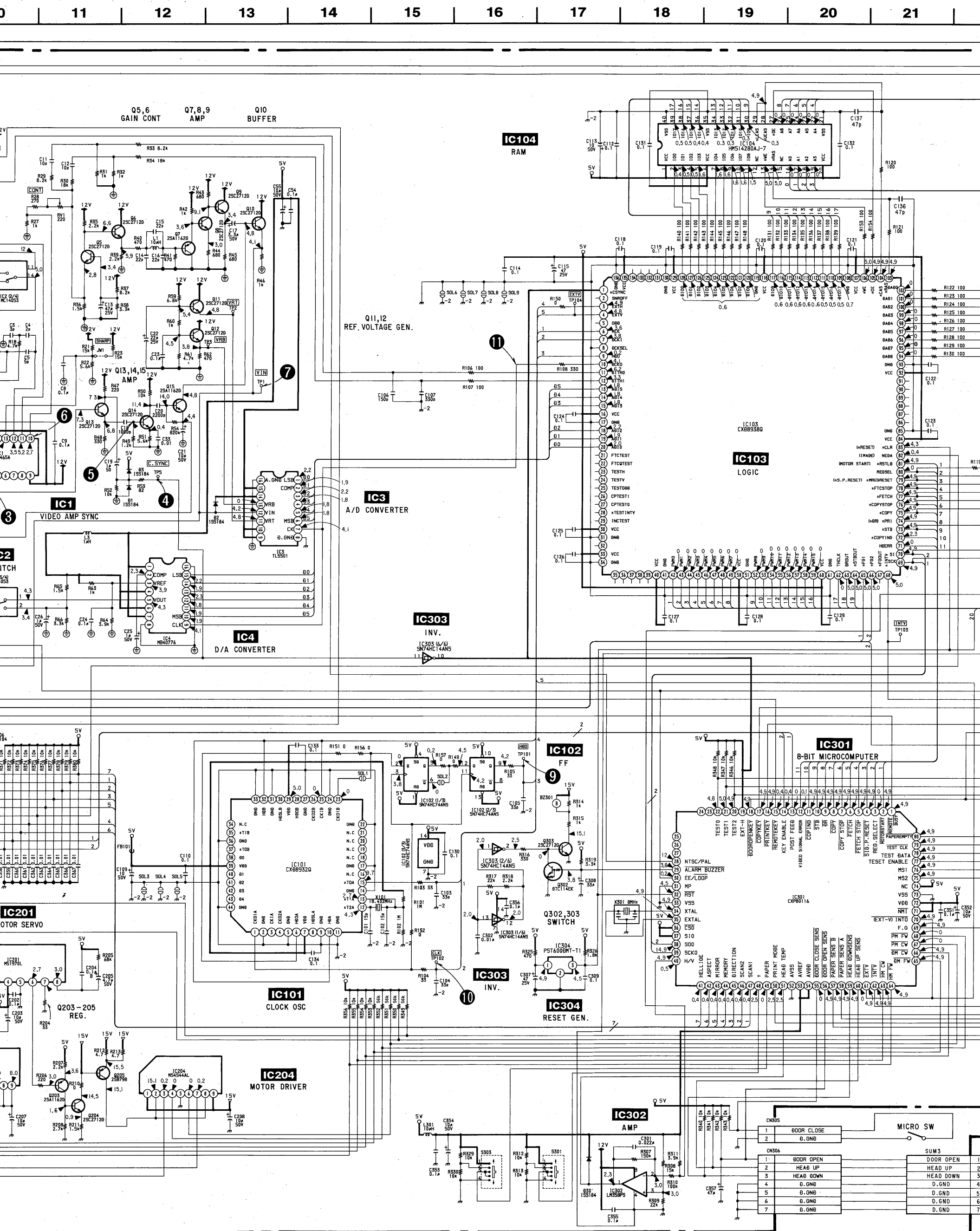


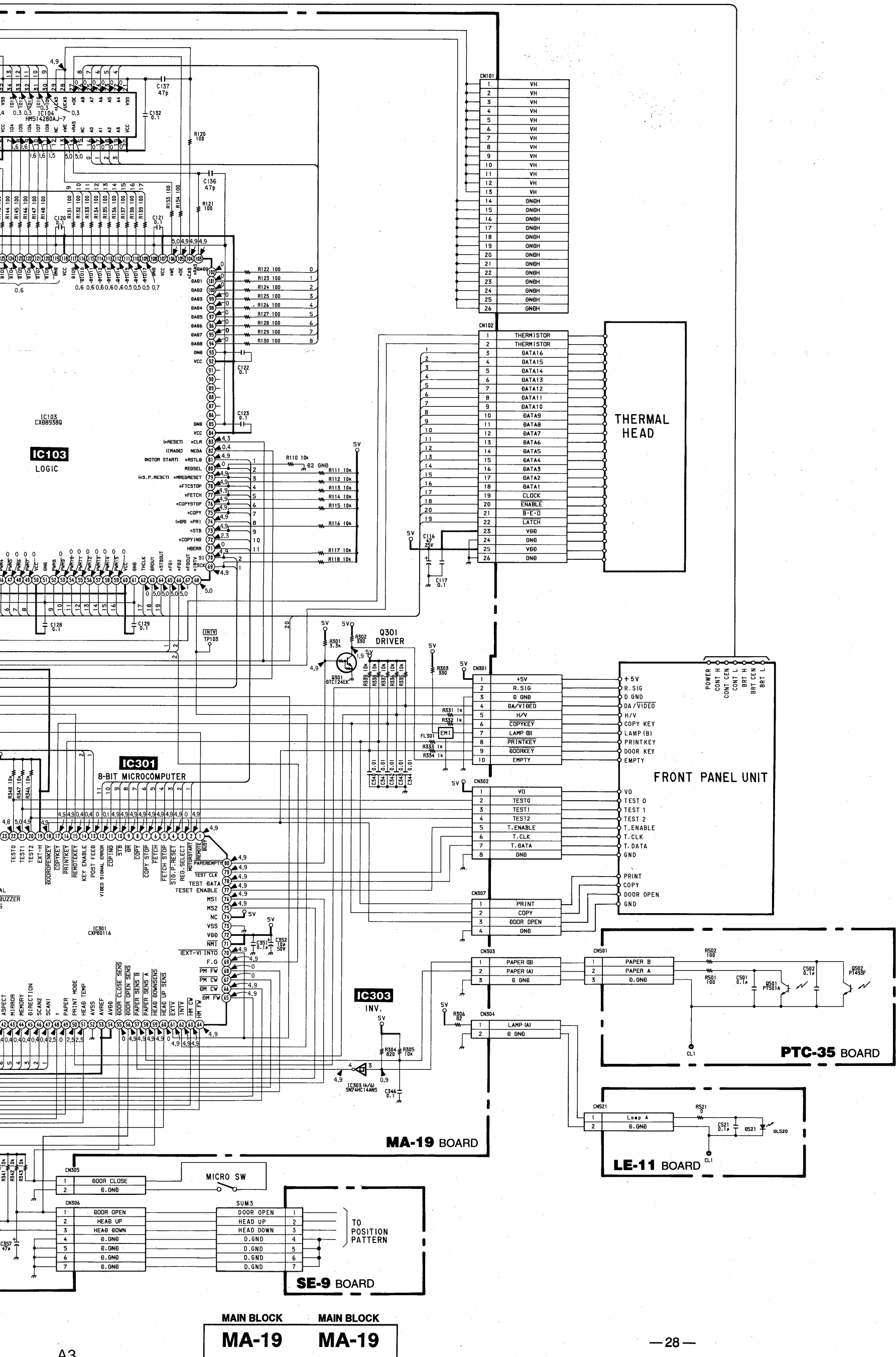
THIS NOTE IS COMMON FOR PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS.
(In addition to this, the necessary note is printed in each block.)

- For Printed Wiring Boards.
- : Soldering Side.
- : Component Side.
- For Schematic Diagrams.
- Caution when replacing chip parts.
New parts must be attached after removal of chip.
Be careful not to heat the minus side of tantalum capacitor, because it is damaged by the heat.
- All resistors are in ohms, 1/10W unless otherwise noted.
kΩ: 1000Ω, MΩ: 1000kΩ.
- All capacitors are in μF unless otherwise noted.
pF: μμF.
- 50V or less are not indicated except for electrolytics and tantalums.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- : nonflammable resistor.
- : fusible resistor.
- : adjustment for repair.
- : B+ Line.
- Circled numbers refer to waveforms.
- Voltages are dc between ground and measurement points.
- Readings are taken with a color-bar signal input.
- Readings are taken with a digital multimeter (DC10MΩ).
- Voltage variations may be noted due to normal production tolerances.

Note: The components identified by shading and mark Δ are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par une trame et par une marque Δ sont d'une importance critique pour la sécurité. Ne les remplacer que par des pièces de numéro spécifié.



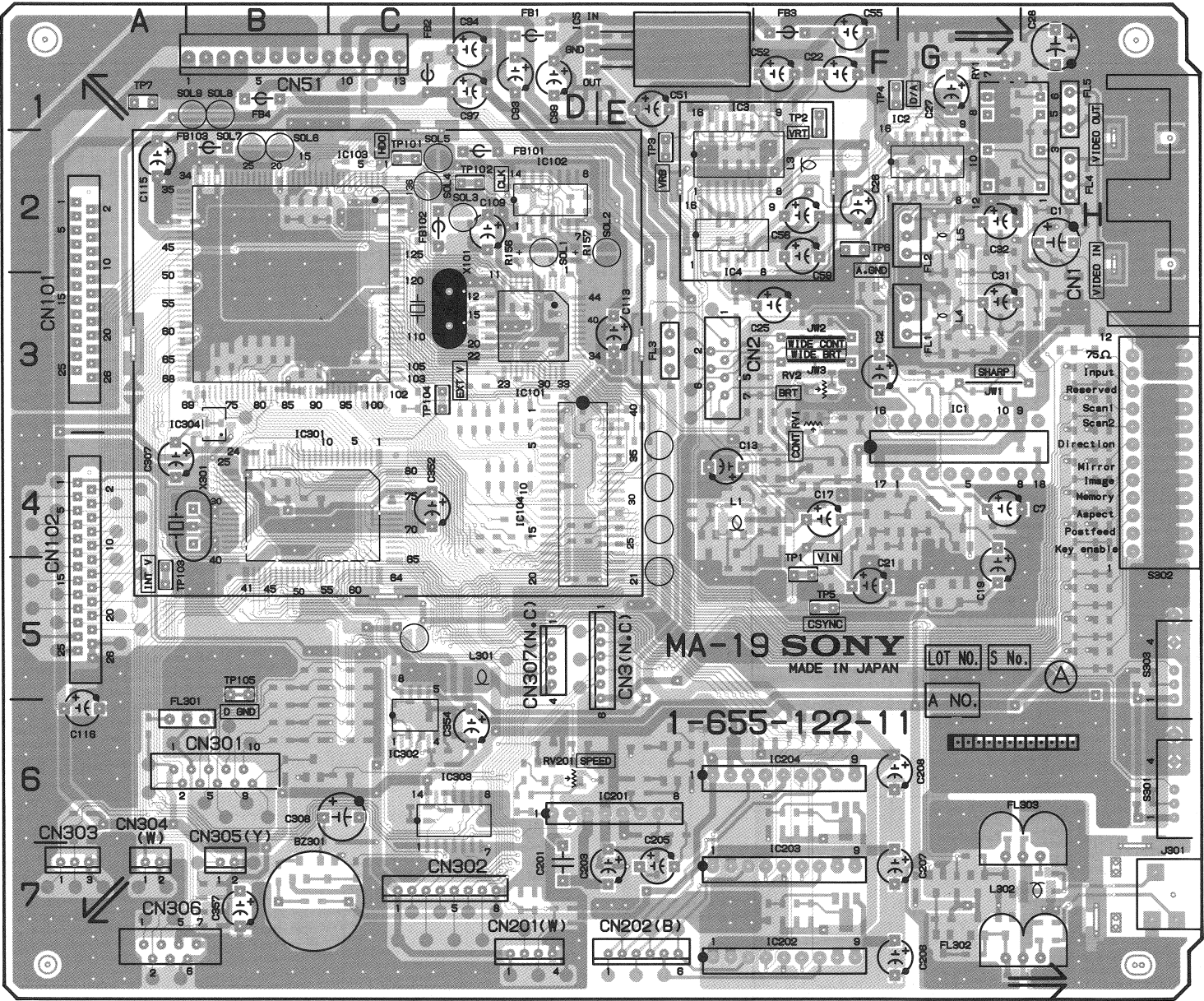


MA-19 (MEMORY CONTROL, VIDEO, SYNC) SE-9 (POS. SENSOR) PTC-35 (PAPER SENSOR) SU-20 (PLATEN MOTOR) LE-11 (LAMP) C-19 (SENSOR)

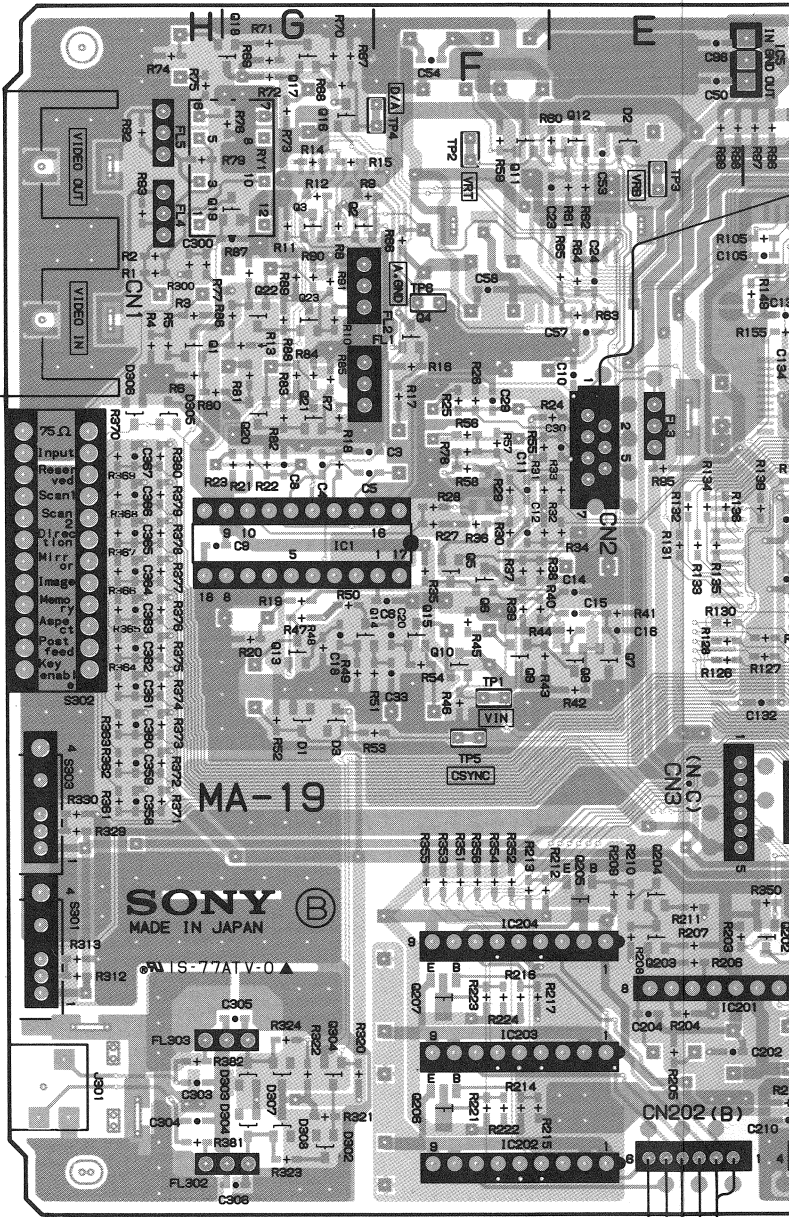
MA-19 BOARD

BZ301	B-7	J301	H-7
CN1	H-2	L1	E-4
CN2	E-3	L3	F-2
CN3	E-5	L4	G-3
CN101	A-3	L5	G-2
CN102	A-5	L301	D-5
CN201	D-7	L302	H-7
CN202	E-7		
CN301	B-6	Q1	H-3
CN302	C-7	Q2	G-2
CN303	A-7	Q3	G-2
CN304	A-7	Q4	F-3
CN305	B-7	Q5	F-4
CN306	A-7	Q6	F-4
CN307	D-5	Q7	E-4
		Q8	E-4
D1	G-5	Q9	F-4
D2	E-1	Q10	F-4
D3	G-5	Q11	F-1
D301	C-6	Q12	E-1
D302	G-7	Q13	G-4
D303	G-7	Q14	G-4
D304	G-7	Q15	F-4
D305	H-3	Q16	G-1
D306	H-3	Q17	G-1
D307	G-7	Q18	G-1
D308	G-7	Q19	G-2
		Q20	G-3
FB1	D-1	Q21	G-3
FB2	C-1	Q22	G-2
FB3	F-1	Q23	G-2
FB4	B-1	Q201	D-6
FB101	D-2	Q202	D-6
		Q203	E-6
		Q204	E-6
		Q205	E-6
		Q206	F-7
		Q207	F-6
FL1	G-3	Q301	B-6
FL2	G-2	Q302	B-7
FL3	E-3	Q303	B-7
FL4	H-2	Q304	G-7
FL5	H-1		
FL301	A-6		
FL302	G-7		
FL303	G-6		
IC1	G-4	RV1	F-3
IC2	G-2	RV2	F-3
IC5	D-1	RV201	D-6
IC101	D-3		
IC102	D-2	RY1	G-1
IC103	B-3		
IC104	D-4	S301	H-6
IC201	E-6	S302	H-4
IC202	F-7	S303	H-4
IC203	F-7		
IC204	F-6	X101	C-3
IC301	B-4	X301	B-4
IC302	C-6		
IC303	C-6		
IC304	B-3		

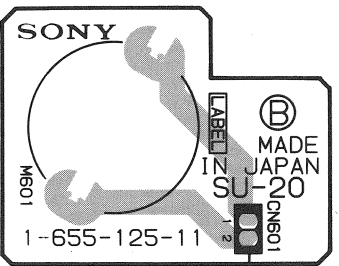
S:SOLDERING SIDE



MA-19 -COMPONENT SIDE-
1-655-122-11

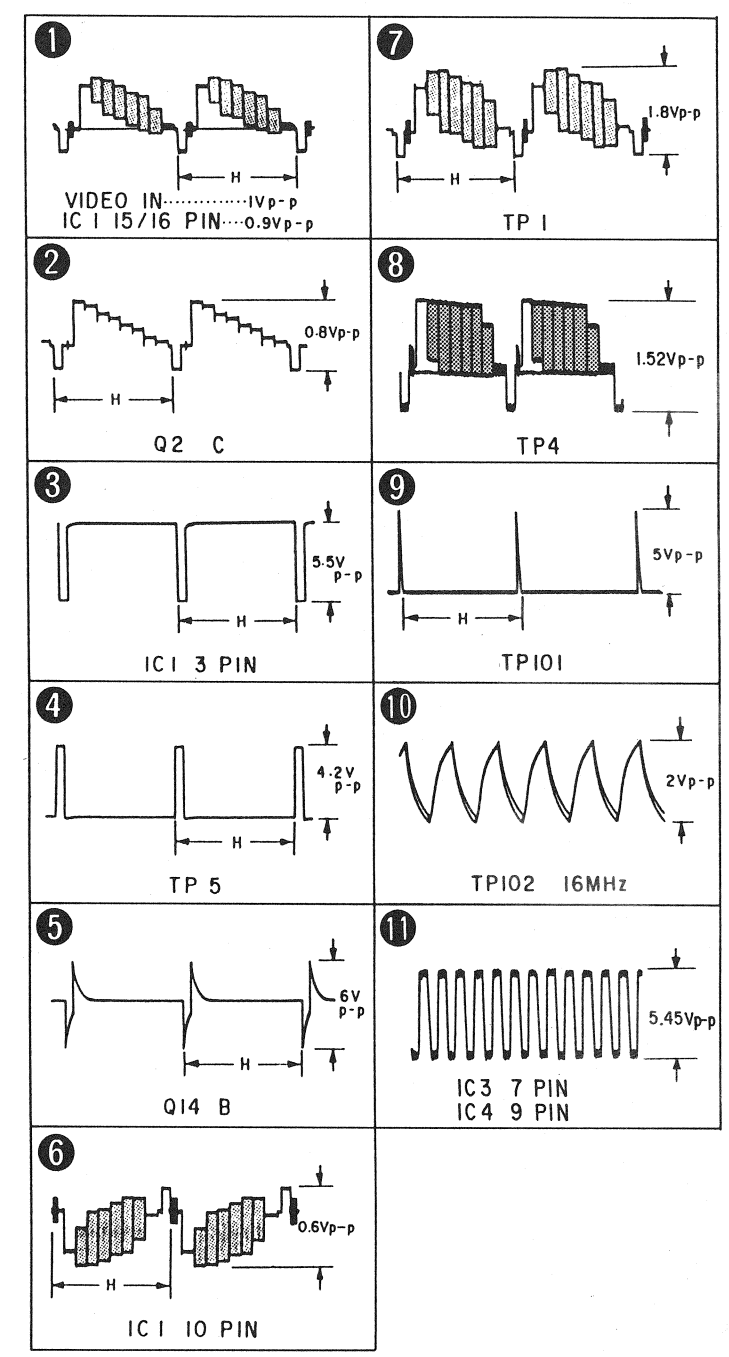
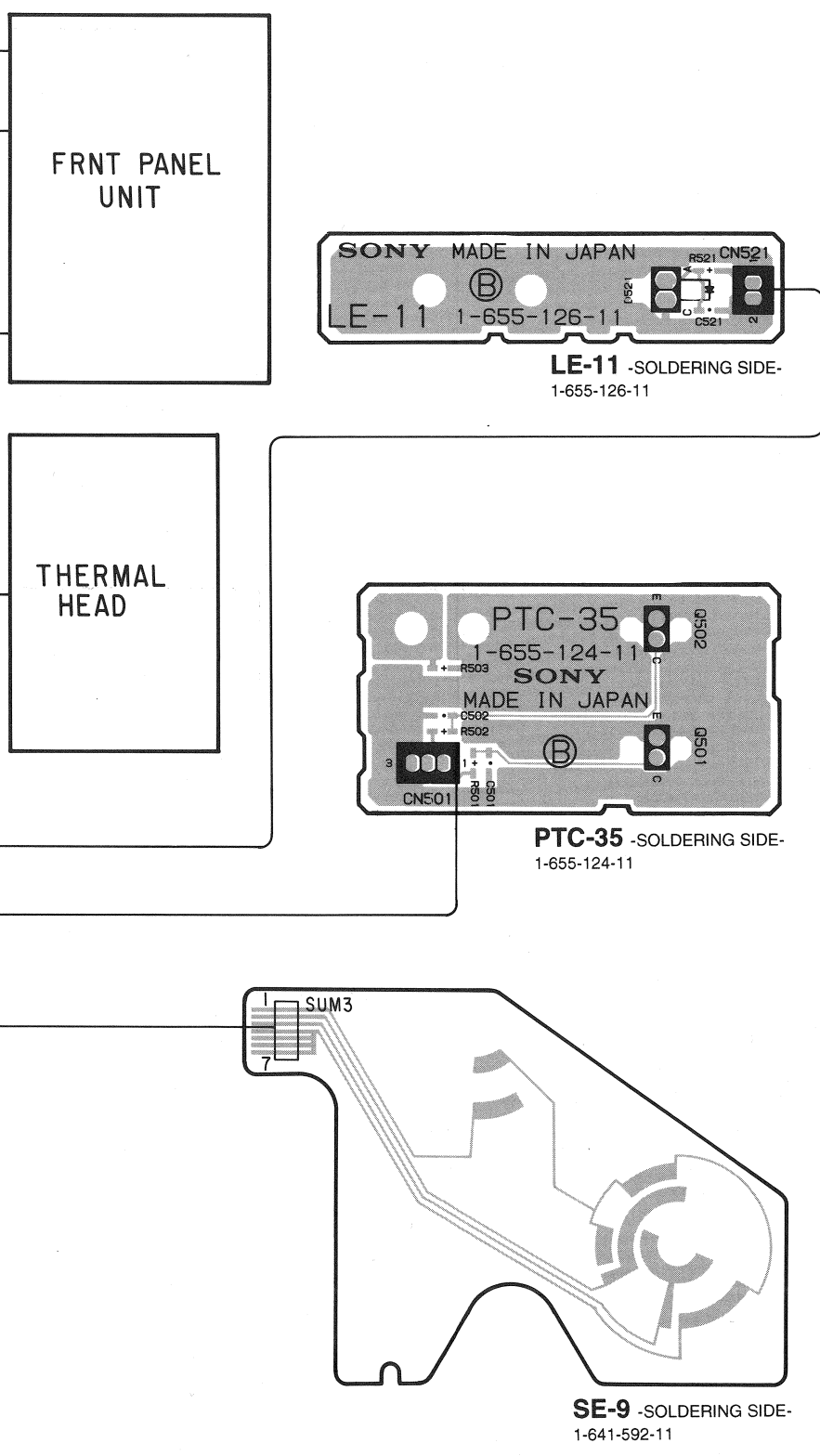
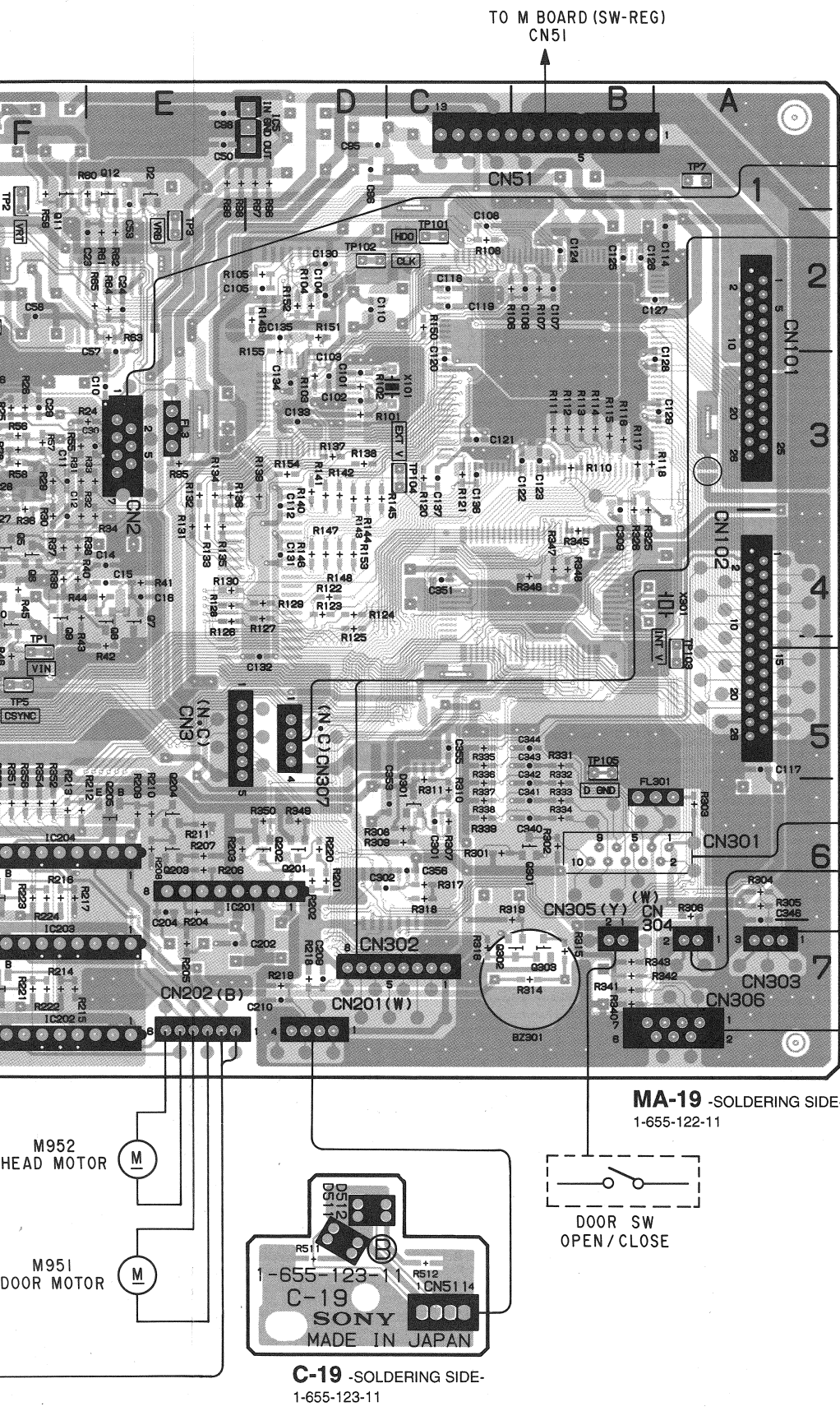


SU-20 -SOLDERING SIDE-
1-655-125-11

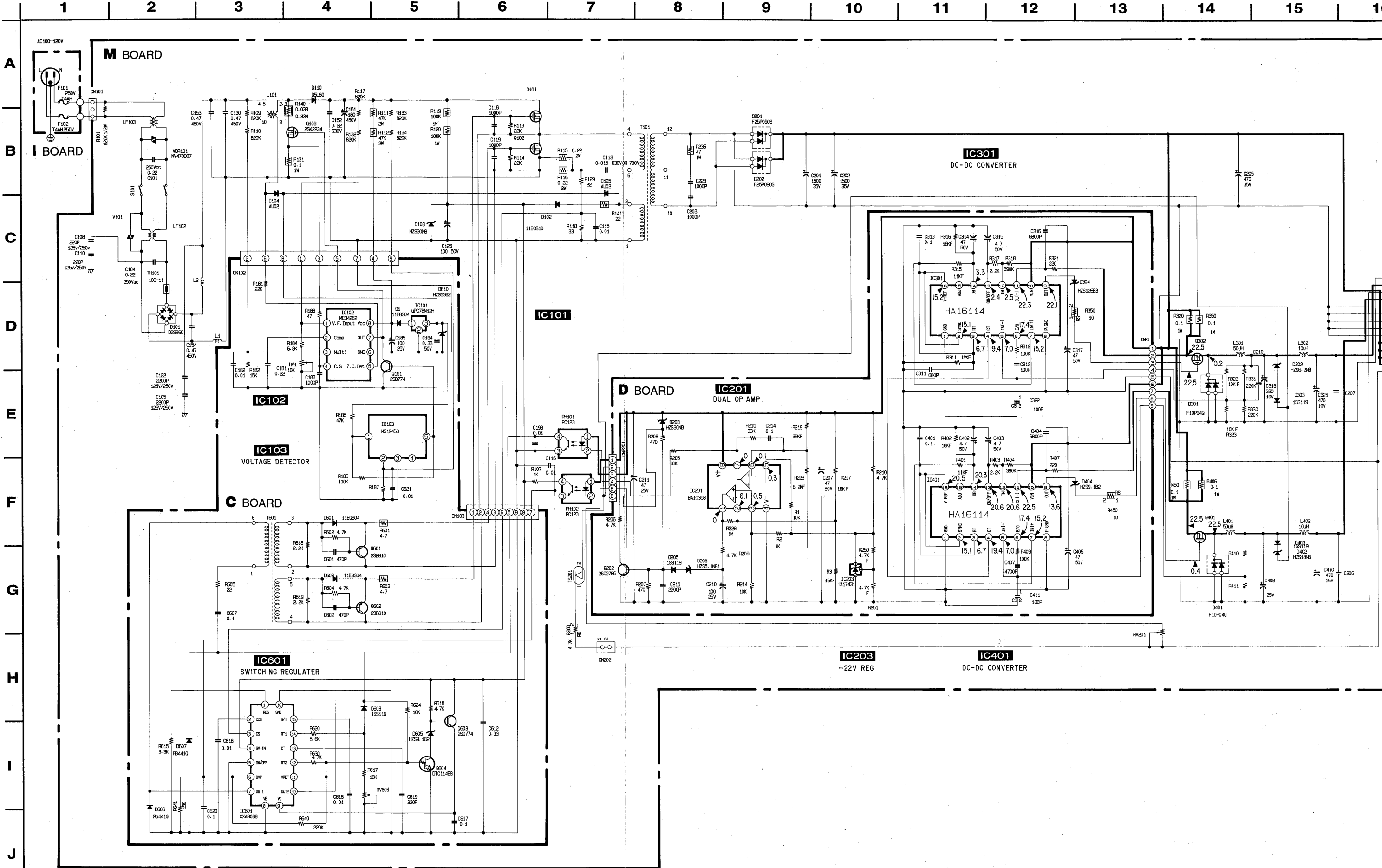


M952
HEAD MOTOR

M951
DOOR MOTOR



M (POWER SUPPLY) C (SWITCHING REGULATOR) D (DC-DC CONVERTER) I (AC IN)



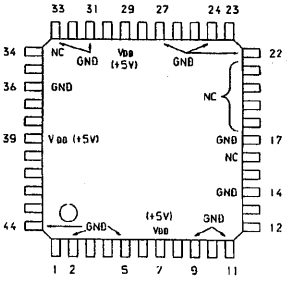
4-4. SEMICONDUCTORS

The chart in this section may sometimes show diodes, transistors, and ICs that are not interchangeable. When replacing a component, be sure to refer to the parts list. The circuit diagram of each IC is obtained from the IC data book published by the manufacturer.

TYPE	PAGE	TYPE	PAGE
1SS184	45	CXD8932Q	40
2SA1162-G	45	CXD8938Q	40
2SB798-DL	45	CXP80P116Q-2-EXP030	41
2SC2712-YG	45	HA11465A	42
2SD999-CLCK	45	HD14053BFP	42
DTA124EK	45	HM514280AJ-7	42
DTC114EK	45	LM358PS	42
DTC124EK	45	M51970L	43
GL-520	45	M54543L	43
GP2S40K	45	M54544AL	43
PT493F	45	MB40776PF	43
PT501A	45	PST523C	44
		SN74HC14ANS	44
		SN74HC74ANS	44
		TA7812S	44

CXD8932Q (SONY)

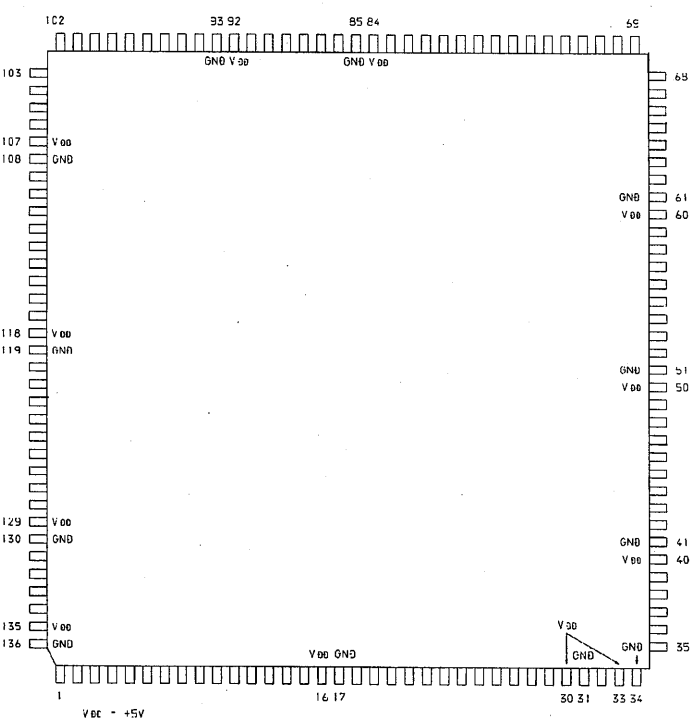
CLOCK OSC
—TOP VIEW—



PIN No.	I/O	SIGNAL	PIN No.	I/O	SIGNAL
1	0	CKD1A	23	0	CKD1B
2	—	GND	24	—	GND
3	1	CK1A	25	1	CK1B
4	0	CKD2A	26	0	CKD2B
5	—	GND	27	—	GND
6	0	HDDA	28	0	HDOB
7	—	VDD	29	—	VDD
8	1	HDSL A	30	1	HDSL B
9	—	GND	31	—	GND
10	1	HDA	32	1	HDB
11	—	GND	33	—	GND
12	0	XT2A	34	—	N.C.
13	1	XT1A	35	1	XT1B
14	—	GND	36	—	GND
15	0	XTDA	37	0	XTDB
16	—	N.C.	38	1	DD
17	—	GND	39	—	VDD
18	—	N.C.	40	1	D1
19	—	N.C.	41	1	D2
20	—	N.C.	42	1	D3
21	—	N.C.	43	1	D4
22	—	GND	44	—	GND

CXD8938Q (SONY)

CELL BASE IC
—TOP VIEW—

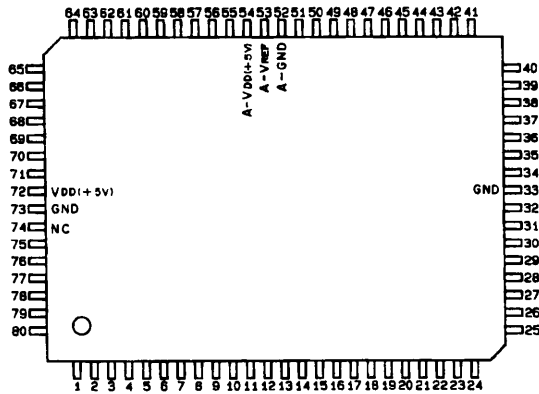


PIN No.	I/O	SIGNAL	PIN No.	I/O	SIGNAL	PIN No.	I/O	SIGNAL	PIN No.	I/O	SIGNAL
1	1	nCSYNC	35	0	SHTST	69	1	SEK	103	0	nRAS
2	1	SNROFF	36	1	LC53	70	1	S1	104	0	nCAS
3	0	EXTH	37	1	LC52	71	0	HDERR	105	0	nOE
4	0	EXTV	38	1	LC51	72	0	nCOPYING	106	0	nWE
5	0	DD	39	1	LC50	73	1	nSTB	107	—	VDD
6	1	RCK	40	—	VDD	74	1	DR1	108	—	GND
7	1	BCK1	41	—	GND	75	1	nCOPY	109	0	D1017
8	1	BCKSEL	42	0	PWM0	76	1	nCOPYSTOP	110	0	D1016
9	1	HDD	43	0	PWM1	77	1	nFETCH	111	0	D1015
10	0	BCKD	44	0	PWM2	78	1	nFTCSTOP	112	0	D1014
11	0	DITH0	45	0	PWM3	79	1	nMREGNCSET	113	0	D1013
12	0	DITH1	46	0	PWM4	80	1	REGSEL	114	0	D1012
13	1	AD15	47	0	PWM5	81	1	nRSTLD	115	0	D1011
14	1	AD14	48	0	PWM6	82	1	NEGA	116	0	D1010
15	1	AD13	49	0	PWM7	83	1	nCLR	117	0	D109
16	—	VDD	50	—	VDD	84	—	VDC	118	—	VDD
17	—	GND	51	—	GND	85	—	GND	119	—	GND
18	1	AD12	52	0	PWM8	86	1	TA05	120	0	D108
19	1	AD11	53	0	PWM9	87	1	TA04	121	0	D107
20	1	AD10	54	0	PWM10	88	1	TA03	122	0	D106
21	1	FTCTEST	55	0	PWM11	89	1	TA02	123	0	D105
22	1	FTCTEST	56	0	PWM12	90	1	TA01	124	0	D104
23	1	TEST1	57	0	PWM13	91	1	TA00	125	0	D103
24	1	TESTV	58	0	PWM14	92	—	VDD	126	0	D102
25	1	TEST0DD	59	0	PWM15	93	—	GND	127	0	D101
26	1	CPTEST1	60	—	VDD	94	0	DA09	128	0	D100
27	1	CPTEST0	61	—	GND	95	0	DA07	129	—	VDD
28	1	nTESTINTV	62	0	THCK	96	0	DA05	130	—	GND
29	1	ISNCTEST	63	0	DRDUT	97	0	DA05	131	1	tWE
30	—	VDD	64	0	nSTBOUT	98	0	DA04	132	1	tDE
31	—	GND	65	1	nFG1	99	0	DA03	133	1	trW
32	1	RAMTEST	66	1	nFG2	100	0	DA02	134	1	1LCSEL
33	—	VDD	67	0	nFGOUT	101	0	DA01	135	—	VDD
34	—	GND	68	0	nINTV	102	0	DA00	136	—	GND

CXP80P116Q-2-EXP030

C-MOS 8-BIT MICROCOMPUTER

—TOP VIEW—

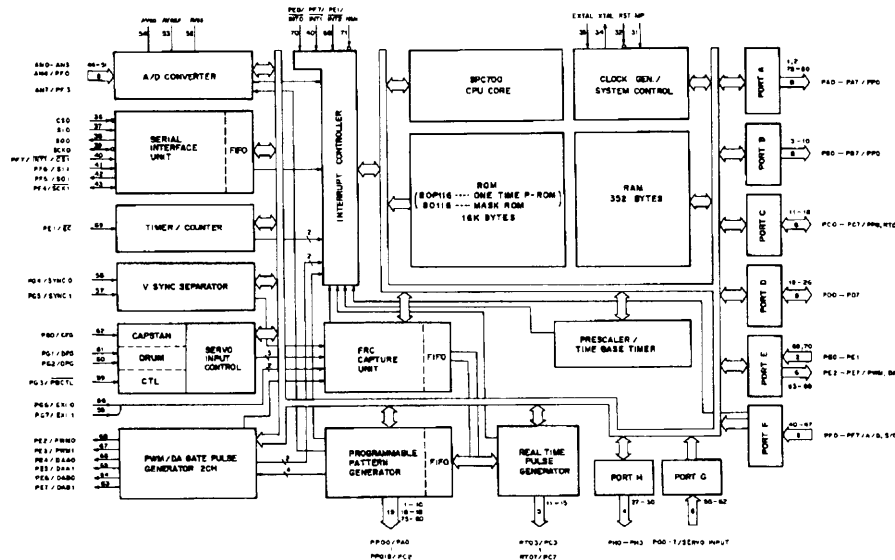


(V_{DD} = +5V)

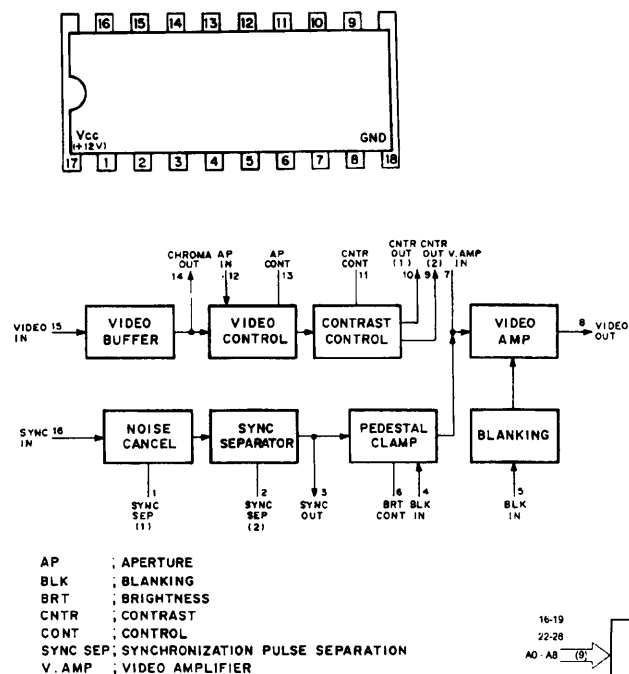
PIN NO.	I/O	SYMBOL	PIN NO.	I/O	SYMBOL
1	O	PA1/PP01/A9	41	I	PF6/S11
2	O	PA0/PP00/A8	42	I/O	PF5/SO1
3	O	PB7/PP015/A7	43	I/O	PF4/SCK1
4	O	PB6/PP014/A6	44	I	PF3/AN7
5	O	PB5/PP013/A5	45	I	PF2/AN6
6	O	PB4/PP012/A4	46	I	PF1/AN5
7	O	PB3/PP011/A3	47	I	PF0/AN4
8	O	PB2/PP010/A2	48	I	AN3
9	O	PB1/PP09/A1	49	I	AN2
10	O	PB0/PP08/A0	50	I	AN1
11	I/O, O, I/O	PC7/RT07/D7	51	I	AN0
12	I/O, O, I/O	PC6/RT06/D6	52	—	A-GND
13	I/O, O, I/O	PC5/RT05/D5	53	—	A-VREF
14	I/O, O, I/O	PC4/RT04/D4	54	—	A-VDD
15	I/O, O, I/O	PC3/RT03/D3	55	I	PG7/EX11
16	I/O, O, I/O	PC2/PP018/D2	56	I	PG6/EX10
17	I/O, O, I/O	PC1/PP017/D1	57	I	PG5/SYNC1
18	I/O, O, I/O	PC0/PP016/D0	58	I	PG4/SYNC0
19	I/O, O	PD7/HALT	59	I	PG3/PBCTL
20	I/O, O	PD6/BRQ	60	I	PG2/DPG
21	I/O, O	PD5/BAK	61	I	PG1/DFG
22	I/O, O	PD4/SYNC	62	I	PG0/CFG
23	I/O, O	PD3/C	63	O	PE7/DAB1
24	I/O, O	PD2/RW	64	O	PE6/DAB0
25	I/O, O	PD1/WR	65	O	PE5/DAA1
26	I/O, O	PD0/RD	66	O	PE4/DAA0
27	O	PH3	67	O	PE3/PWM1
28	O	PH2	68	O	PE2/PWM0
29	O	PH1	69	I	PE1/EC/INT2
30	O	PH0	70	I	PE0/INT0
31	I	MP	71	I	NMI
32	I/O	RST	72	—	VDD
33	—	GND	73	—	GND
34	O	XTAL	74	—	NC
35	I	EXTAL	75	O	PA7/PP07/A15
36	I	CS0	76	O	PA6/PP06/A14
37	I	S10	77	O	PA5/PP05/A13
38	O	S00	78	O	PA4/PP04/A12
39	I/O	SCK0	79	O	PA3/PP03/A11
40	I	PF7/INT1/CS1	80	O	PA2/PP02/A10

18	PC0 / PP016 / D0	PB0 / PP08 / A0	10	PC0 / PP016 / D0
17	PC1 / PP017 / D1	PB1 / PP09 / A1	9	PC1 / PP017 / D1
16	PC2 / PP018 / D2	PB2 / PP10 / A2	8	PC2 / PP018 / D2
15	PC3 / RT03 / D3	PB3 / PP11 / A3	7	PC3 / RT03 / D3
14	PC4 / RT04 / D4	PB4 / PP12 / A4	6	PC4 / RT04 / D4
13	PC5 / RT05 / D5	PB5 / PP13 / A5	5	PC5 / RT05 / D5
12	PC6 / RT06 / D6	PB6 / PP14 / A6	4	PC6 / RT06 / D6
11	PC7 / RT07 / D7	PB7 / PP15 / A7	3	PC7 / RT07 / D7
51	AN0	PA0 / PP00 / A8	1	AN0
50	AN1	PA1 / PP01 / A9	2	AN1
49	AN2	PA2 / PP02 / A10	3	AN2
48	AN3	PA3 / PP03 / A11	4	AN3
47	PF0 / AN4	PA4 / PP04 / A12	5	PF0 / AN4
46	PF1 / AN5	PA5 / PP05 / A13	6	PF1 / AN5
45	PF2 / AN6	PA6 / PP06 / A14	7	PF2 / AN6
44	PF3 / AN7	PA7 / PP07 / A15	8	PF3 / AN7
62	PG0 / CFG	PE2 / PWM0	68	PG0 / CFG
61	PG1 / DFG	PE3 / PWM1	67	PG1 / DFG
60	PG2 / DFG	PE4 / DAA0	66	PG2 / DFG
59	PG3 / PBCTL	PE5 / DAA1	65	PG3 / PBCTL
58	PG4 / SYNC0	PE6 / BAB0	64	PG4 / SYNC0
57	PG5 / SYNC1	PE7 / BAB1	63	PG5 / SYNC1
56	PG6 / EX10	PH0	30	PG6 / EX10
55	PG7 / EX11	PH1	29	PG7 / EX11
26	PD0 / RD	PH2	28	PD0 / RD
25	PD1 / WR	PH3	27	PD1 / WR
24	PD2 / R / W	MP	31	PD2 / R / W
23	PD3 / C	RST	32	PD3 / C
22	PD4 / SYNC	S00	33	PD4 / SYNC
21	PD5 / BAK	WR	38	PD5 / BAK
20	PD6 / BRQ	SCK0	39	PD6 / BRQ
19	PD7 / HALT	PF5 / S01	42	PD7 / HALT
35	EXTAL	PF6 / S11	41	EXTAL
34	CS0	PF7 / INT1 / CS1	40	CS0
33	S10	PF8 / INT1 / CS1	39	S10
32	PE0 / INT0	PF9 / INT1 / CS1	38	PE0 / INT0
31	PE1 / EC / INT2	PF10 / INT1 / CS1	37	PE1 / EC / INT2
30	PE2 / PWM0	PF11 / INT1 / CS1	36	PE2 / PWM0
29	PE3 / PWM1	PF12 / INT1 / CS1	35	PE3 / PWM1
28	PE4 / DAA0	PF13 / INT1 / CS1	34	PE4 / DAA0
27	PE5 / DAA1	PF14 / INT1 / CS1	33	PE5 / DAA1
26	PE6 / DAB0	PF15 / INT1 / CS1	32	PE6 / DAB0
25	PE7 / DAB1	PF16 / INT1 / CS1	31	PE7 / DAB1
24	PE8 / DAB2	PF17 / INT1 / CS1	30	PE8 / DAB2
23	PE9 / DAB3	PF18 / INT1 / CS1	29	PE9 / DAB3
22	PE10 / DAB4	PF19 / INT1 / CS1	28	PE10 / DAB4
21	PE11 / DAB5	PF20 / INT1 / CS1	27	PE11 / DAB5
20	PE12 / DAB6	PF21 / INT1 / CS1	26	PE12 / DAB6
19	PE13 / DAB7	PF22 / INT1 / CS1	25	PE13 / DAB7
18	PE14 / DAB8	PF23 / INT1 / CS1	24	PE14 / DAB8
17	PE15 / DAB9	PF24 / INT1 / CS1	23	PE15 / DAB9
16	PE16 / DABA	PF25 / INT1 / CS1	22	PE16 / DABA
15	PE17 / DABB	PF26 / INT1 / CS1	21	PE17 / DABB
14	PE18 / DABC	PF27 / INT1 / CS1	20	PE18 / DABC
13	PE19 / DABD	PF28 / INT1 / CS1	19	PE19 / DABD
12	PE20 / DABE	PF29 / INT1 / CS1	18	PE20 / DABE
11	PE21 / DABF	PF30 / INT1 / CS1	17	PE21 / DABF
10	PE22 / DABG	PF31 / INT1 / CS1	16	PE22 / DABG
9	PE23 / DABH	PF32 / INT1 / CS1	15	PE23 / DABH
8	PE24 / DABI	PF33 / INT1 / CS1	14	PE24 / DABI
7	PE25 / DABJ	PF34 / INT1 / CS1	13	PE25 / DABJ
6	PE26 / DABK	PF35 / INT1 / CS1	12	PE26 / DABK
5	PE27 / DABL	PF36 / INT1 / CS1	11	PE27 / DABL
4	PE28 / DABM	PF37 / INT1 / CS1	10	PE28 / DABM
3	PE29 / DABN	PF38 / INT1 / CS1	9	PE29 / DABN
2	PE30 / DABO	PF39 / INT1 / CS1	8	PE30 / DABO
1	PE31 / DABP	PF40 / INT1 / CS1	7	PE31 / DABP

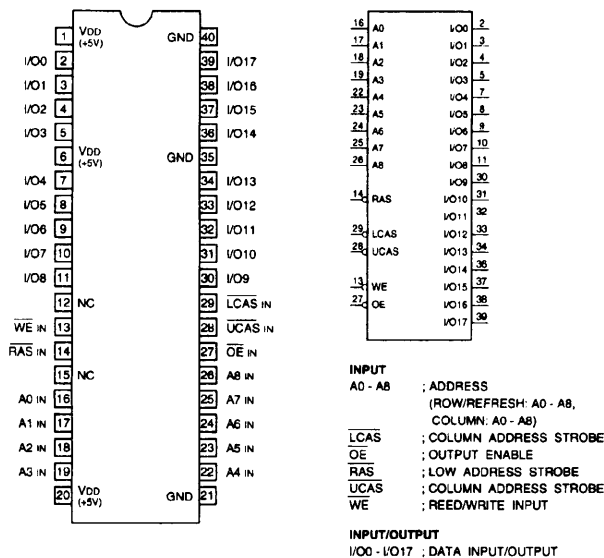
AN0 - AN7	: ANALOG INPUTS
BRQ	: BUS REQUEST INPUT
CFG	: CAPSTAN FG INPUT
CS0.1	: CHIP SELECT INPUTS
DPG	: DRUM FG INPUT
DPG	: DRUM PG INPUT
EC	: EVENT INPUT
EX10.1	: EXTERNAL INPUTS
EXTAL	: SYSTEM CLOCK GENERATE JOINT
HALT	: CPU STOP INPUT
INT0 - INT2	: EXTERNAL OFFERING INPUTS
MP	: MICRO PROCESSOR MODE INPUT
NMI	: NONMASKABLE OFFERING INPUT
PBCTL	: PB CTL PULSE INPUT
PE0.1	: PORT E INPUTS
PF0 - PF7	: PORT F INPUTS
PG0 - PG7	: PORT G INPUTS
S10.1	: SERIAL DATA INPUTS
SYNC0.1	: COMPOSITE SYNC INPUTS
OUTPUT	
A0 - A15	: ADDRESS BUS OUTPUTS
BAK	: BUS ACKNOWLEDGE OUTPUT
C	: TIMING SIGNAL OUTPUT
DAA0.1	: DA GATE PULSE OUTPUTS
DAB0.1	: DA GATE PULSE OUTPUTS
PA0 - PA7	: PORT A OUTPUTS
PB0 - PB7	: PORT B OUTPUTS
PE2 - PE7	: PORT E OUTPUTS
PH0 - PH3	: PORT H OUTPUTS
PP00 - PP018	: PROGRAMMABLE PATTERN GENERATOR OUTPUTS
PWM0.1	: PWM OUTPUTS
R/W	: CPU MACHINE CYCLE
RD	: READ
RT03 - RT07	: REAL TIME PULSE OUTPUTS
S00.1	: SERIAL DATA OUTPUTS
SYNC	: SYNC
WR	: WRITE
XTAL	: SYSTEM CLOCK GENERATOR OUTPUT
INPUT/DUTY	
D0 - D7	: DATA BUS
PC0 - PC7	: PORT C
PD0 - PD7	: PORT D
RST	: RESET
SCK0.1	: SERIAL CLOCK



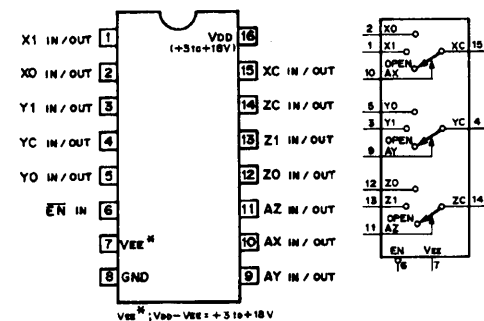
HA11465A

NTSC COLOR TV VIDEO AMPLIFIER
—TOP VIEW—

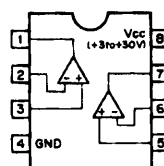
HM514280AJ-7

C-MOS 4M (262144Wx18)-BIT DYNAMIC RAM
—TOP VIEW—

HD14053BFP (HITACHI) FLAT PACKAGE

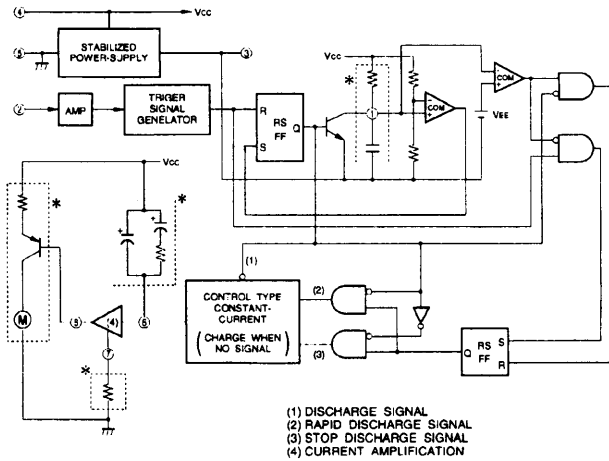
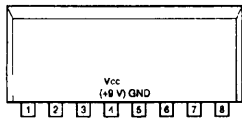
C-MOS TRIPE 2-CHANNEL ANALOG MULTIPLEXERS/DEMULPLEXERS
—TOP VIEW—

LM358PS (TI) FLAT PACKAGE



M51970L (MITSUBISHI)

MOTOR SPEED CONTROL —SIDE VIEW—

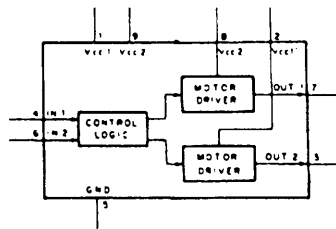
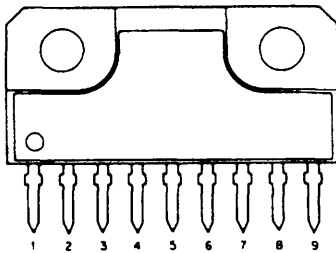


Note:

1. ○ mark is pin number.
2. * The areas with dotted line mean the parts installed out side.

M54543L (MITSUBISHI)

BI-DIRECTIONAL MOTOR DRIVER —SIDE VIEW—

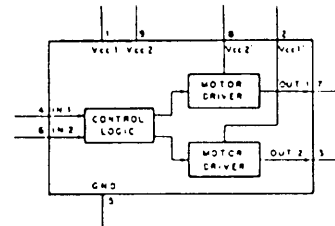
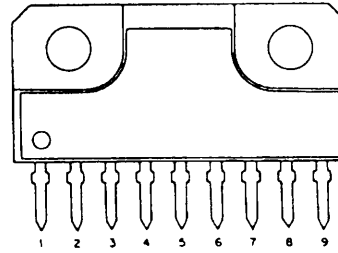


IN		OUT		
1	2	1	2	MODE
0	0	2	2	NO OPERATION
1	0	1	0	ROTATION
0	1	0	1	REVERSE ROTATION
1	1	0	0	BRARE

0: LOW LEVEL
1: HIGH LEVEL
2: HIGH IMPEDANCE

M54544AL (MITSUBISHI)

BI-DIRECTIONAL MOTOR DRIVER —SIDE VIEW—

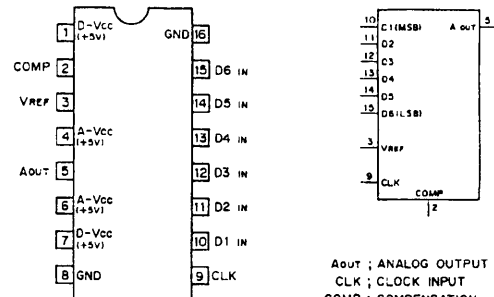


IN	OUT	MODE	
1	2	1	2
0	0	2	2
1	0	1	0
0	1	0	1
1	1	0	0

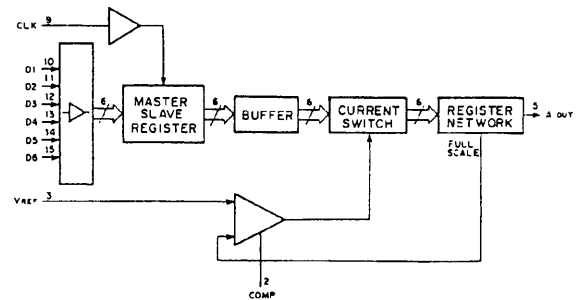
0: LOW LEVEL
1: HIGH LEVEL
2: HIGH IMPEDANCE

MB40776PF

6-BIT VIDEO D/A CONVERTER —TOP VIEW—

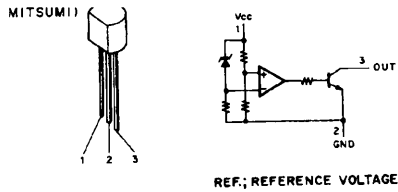


AOUT: ANALOG OUTPUT
CLK: CLOCK INPUT
COMP: COMPENSATION
D1-D6: DIGITAL INPUTS
VREF: REFERENCE VOLTAGE INPUT



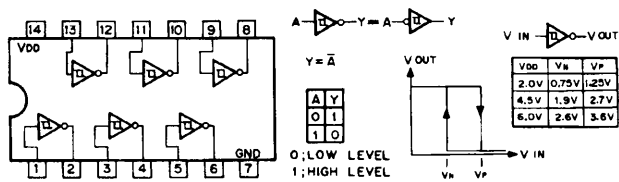
PST523C (MITSUMI) 4.5V

SYSTEM RESETING DEVICE



SN74HC14ANS (TI) FLAT PACKAGE

C-MOS HEX SCHMITT TRIGGER INVERTERS
—TOP VIEW—

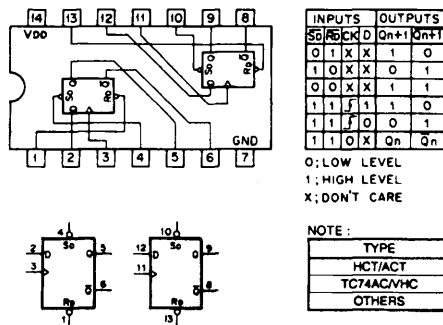


NOTE:

TYPE	VDD
TC74AC/VHC	+2 to +5.5V
OTHER TYPES	+2 to +6V

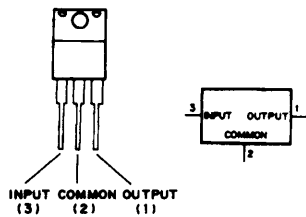
SN74HC74ANS (TI) FLAT PACKAGE

C-MOS DUAL D-TYPE FLIP-FLOPS WITH DIRECT SET/RESET
—TOP VIEW—



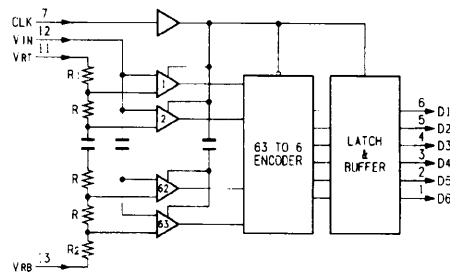
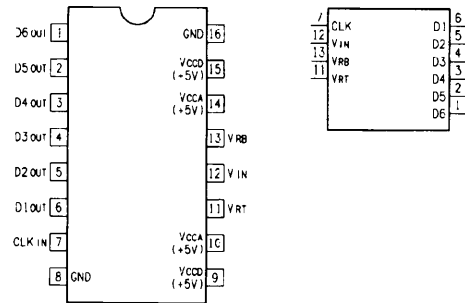
TA7812S (TOSHIBA) + 12V (1 A)

POSITIVE VOLTAGE REGULATOR
—FRONT VIEW—

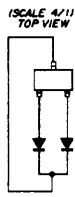


TL5501CDWA (TI)

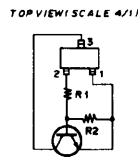
6-BIT A/D CONVERTER
—TOP VIEW—



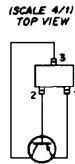
1SS184



DTC114EK
DTC124EK



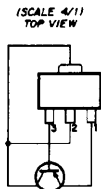
2SA1162-G



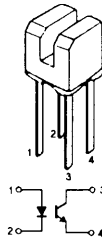
GL-520



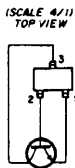
2SB798-DL



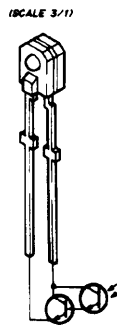
GP2S40K



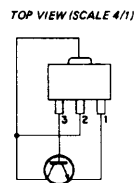
2SC2712-YG



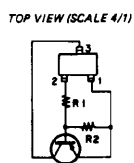
PT493F



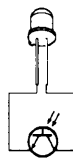
2SD999-CLCK



DTA124EK



PT501A



SECTION 5

CIRCUIT DESCRIPTION

5-1. VIDEO CIRCUIT

5-1-1. Operation

A composite video signal is input from the BNC connector(CN1-(VIDEO-IN)) to the MA-19 board. The composite video signal is terminated with 75 ohms by R1 and R2 when the DIP switch (S302-⑫) is set to ON. The signal then passes through the input buffer and branches into three routes. Two of these three signals are input through trap circuit 1 (FL1 for NTSC signal) and trap circuit 2 (FL2 for PAL signal) to the analog switch (IC2-③⑤) and selected in accordance with the NTSC or PAL judgment of a microcomputer. The automatically selected signal and the signal supplied directly to the input buffer are input to the analog switch (IC2-⑫⑬). An original signal is selected when the DIP switch (S302-⑪) is set to ON. A luminance signal (Y signal) from which the color subcarrier signal has been extracted by the trap circuit is selected when it is set to OFF. The selected signal is input through the buffer to IC1-⑮⑯.

IC1(1) extracts the C sync signal, (2) emphasizes the picture, and (3) adjusts the contrast. The extracted C sync signal is output from IC1-③. The degree of the picture emphasis does not change because the value of the DC voltage input to IC1-⑬ is fixed. The signal gain is controlled by changing the DC voltage value at IC1-⑪ with the CONT control on the front panel. The gain of the video signal output from IC1-⑩ is adjusted with RV1. The dither signal output from IC103-⑪⑫ is injected into the gain-adjusted signal. The signal is then band-limited using a low-pass filter and passed through the clamping circuit. The clamp level at that time is determined by RV2 and the BRT control on the front panel.

The video signal is then input to the analog-digital converter (IC3-⑫) and converted into 6-bit digital data.

The sampling clock for the analog-digital converter is the 18.432 MHz clock output from IC103-⑩. The converted digital data is sent to frame memory (IC104) and digital-analog converter IC4 and reconverted into analog data. The resultant signal is output from IC4-⑤. Since this signal lacks a sync signal, the sync signal is injected by analog switch IC2. An original signal supplied directly to CN1-(VIDEO IN) is output from CN1-(VIDEO OUT).

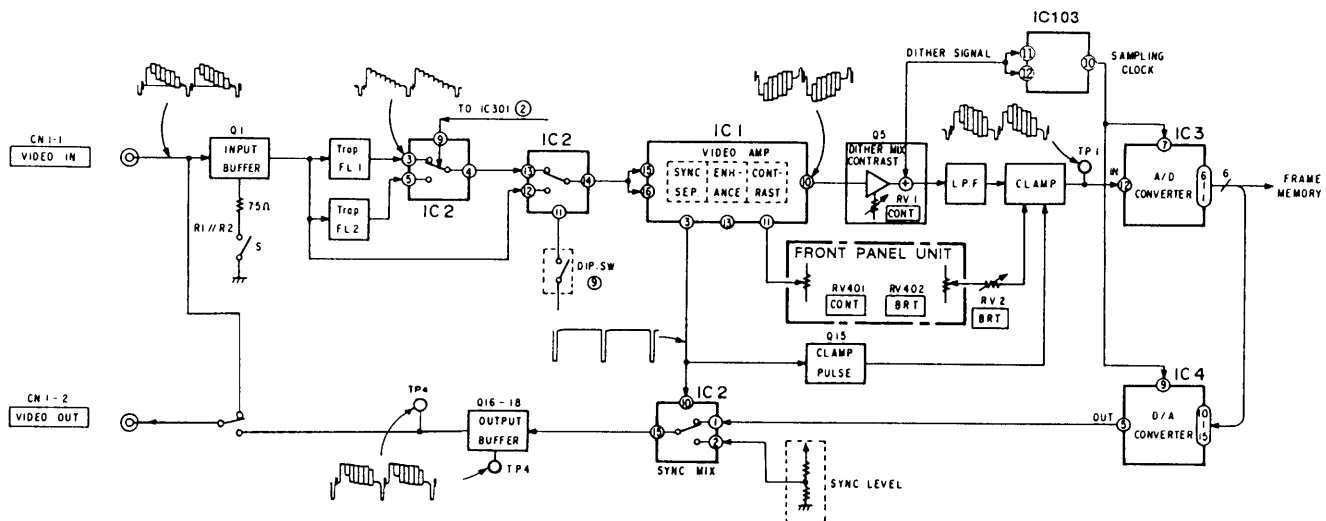


Fig.5-1. Video Signal Processing Section Block Diagram

5-2. OSCILLATION CIRCUIT

An external crystal oscillator is connected to IC101, so the master clock is output from Pin ① and the sampling clock is output from Pin ⑤. Both these clocks are 18.432 MHz, but the phase of the sampling clock is matched at the falling edge of the **EXT H** signal input to Pin ⑩. (See the figure below.)

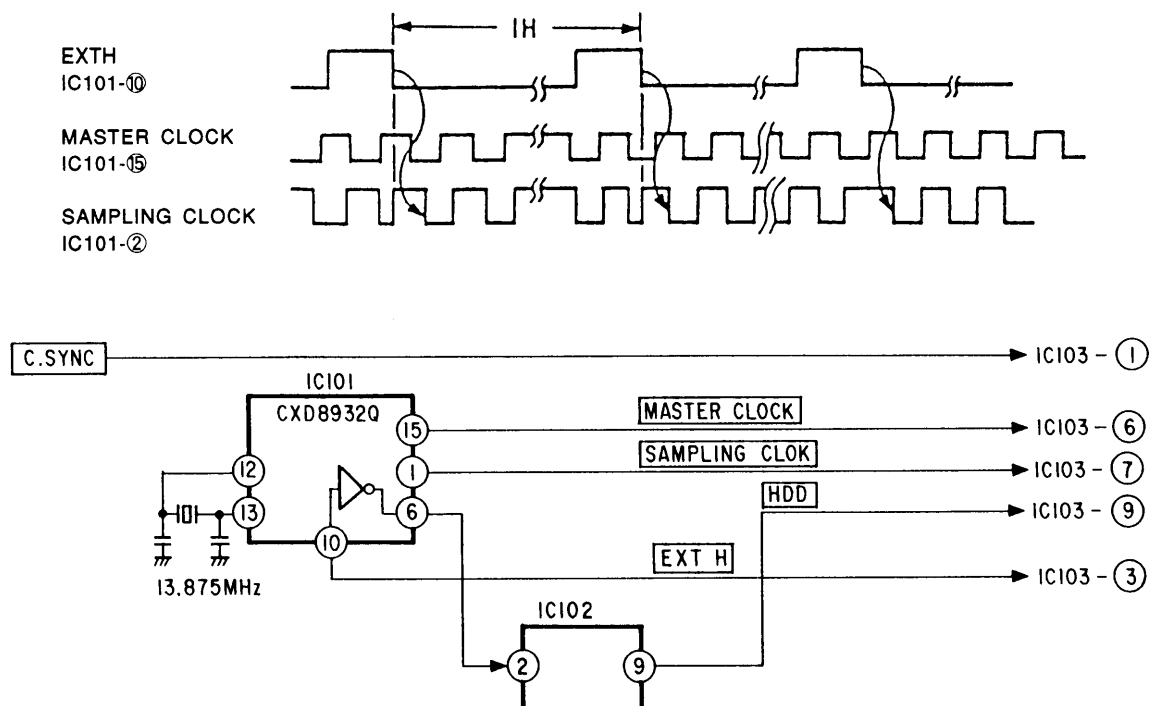


Fig.5-2 Clock Timing Chart and Circuit Diagram.

5-3. PERIPHERAL CIRCUIT IC103

IC103 consists of the following blocks.

- (1) Operation coefficient memory (for variable power operation of picture)
- (2) Storage register of serial data from CPU (for mode setting)
- (3) Frame memory write and read control
- (4) 1-line print timing pulse generation
- (5) Thermal head control
- (6) Dither signal generation
- (7) Sync signal processing circuit
- (8) 1-line memory
- (9) Picture variable power operation circuit

The operation of each block is determined by the serial data from a CPU and the mode selection pin.

5-3-1. Operation Description

- (1) Write in operation coefficient memory

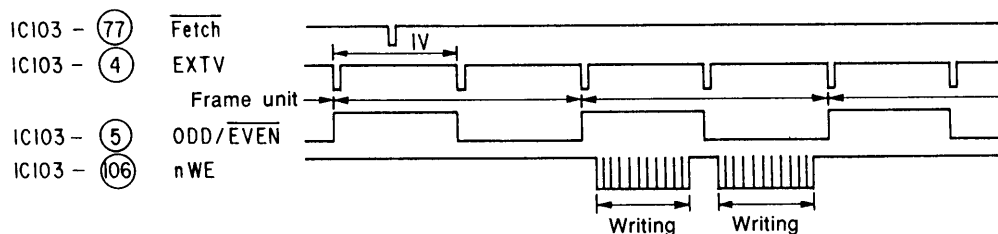
A CPU writes 128-byte coefficient data requires for the variable power operation of a picture in the operation coefficient memory inside IC103. This operation is performed only once during the power-on sequence.

- (2) Mode setting

A CPU transfers serial data of 112 bits to the shift register in IC103 when it judges the status of DIP switch S302. The modes of each block in IC103 are set by this data.

- (3) Write in frame memory

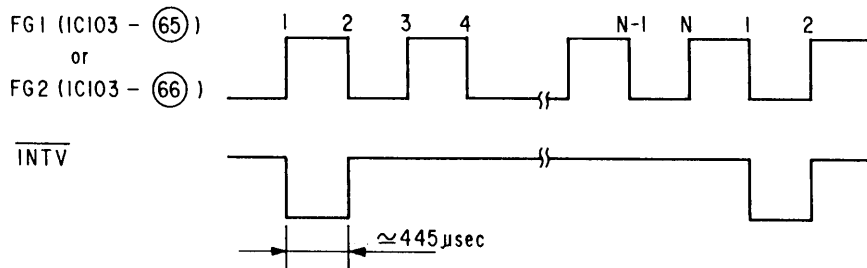
When a Fetch pulse is input from the CPU to pin ⑦⑦ of IC103, the next data of one frame is written in frame memory. At that time, the nWE signal at pin ⑩⑥ of IC103 changes as shown below.



(4) Print timing pulse generation

A print timing pulse ($\overline{\text{INTV}}$) for every line is produced by decrementing the rising and falling edges of two FG pulses FG1 or FG2 of a DC motor servo. FG pulses FG1 and FG2, and decrement count "N" are set by the serial data from a CPU. By changing the FG pulses and decrement count, the print period changes and the print line pitch also changes because the motor speed is constant.

The print timing pulse ($\overline{\text{INTV}}$) is used for the detection of CPU motor speed as well as print timing. The CPU judges the motor speed from the period of the $\overline{\text{INTV}}$ pulse and stops the motor when it detects abnormality.



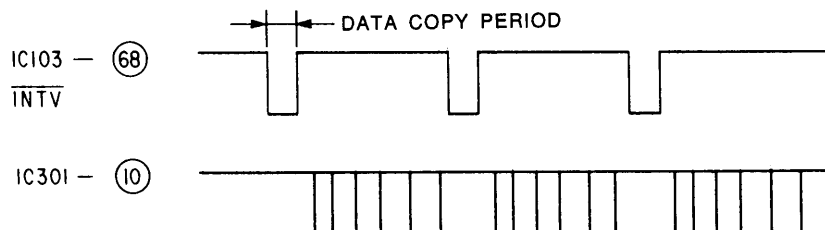
	STD		SIDE	
	NTSC	PAL	NTSC	PAL
Normal	FG2, N=12	FG2, N=10	FG1, N=10	FG1, N=10
Small	FG2, N=12	FG2, N=10	FG1, N=10	FG1, N=10
Zoom 1.5×	FG2, N= 9	FG1, N= 7	FG2, N= 8	FG2, N= 8
Zoom 2×	FG2, N=12	FG2, N=10	FG1, N=10	FG1, N=10

(5) Transfer from frame memory to line memory

When a $\overline{\text{COPY}}$ pulse is input from the CPU, IC103 sets $\overline{\text{COPYING}}$ low and enters the print operation state. To ensure printing, the one-line data selected out of frame memory must be transferred to the one-line memory incorporated in IC103.

The frame memory consists of two field memories that are classified into odd and even fields. IC103 reads necessary print data from the frame memory in the order corresponding to the print range and direction specified for mode setting by the CPU and transfers the data to the one-line memory in IC103 after variable power processing.

Data is transferred for every $\overline{\text{INTV}}$ pulse during low period.

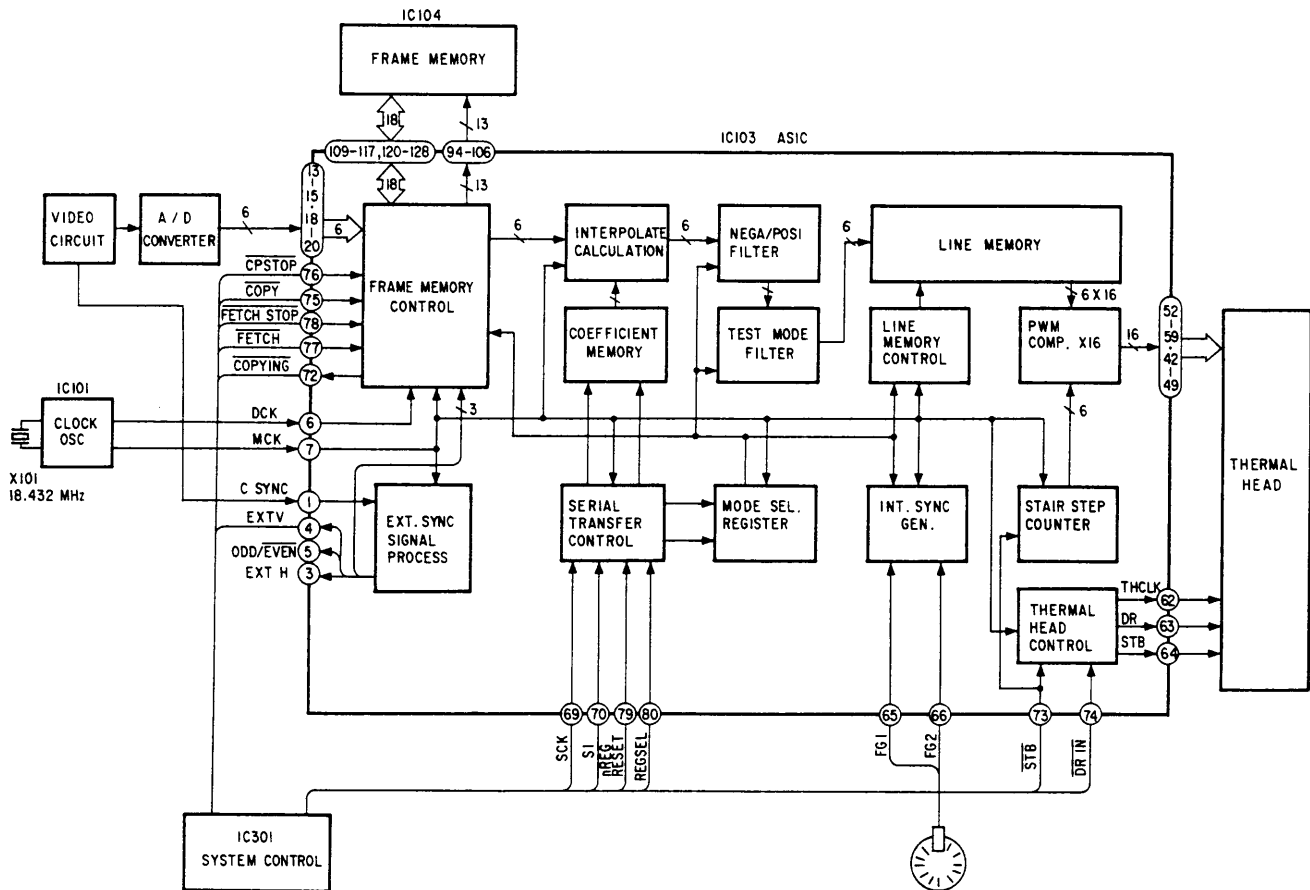


(6) Read from one-line memory

Data is read from one-line memory while an $\overline{\text{INTV}}$ pulse is high. When an $\overline{\text{STB}}$ pulse is input to pin 73 of IC103 from the CPU, IC102 initiates the read operation from the one-line memory and is compared with a gradation counter. The comparison result is converted from serial to parallel, sent to the thermal head, and latched in the thermal head using a next $\overline{\text{STB}}$ pulse. When a $\overline{\text{DR}}$ signal is output from the CPU, the thermal head is turned on according to the latched data. This read operation is repeated 64 times while an $\overline{\text{INTV}}$ pulse is high. One-line printing is then completed.

(7) Printing completion

A CPU sets the print start coordinates and print end coordinates by serial data. When the printing in the set range is completed, IC103 sets $\overline{\text{COPYING}}$ high again and notifies the CPU that one-screen printing is completed.



5-4. SYSTEM CONTROL SECTION

PRINT preparations

- (i) Turn on the power and check that the POWER LED lights .
- (ii) Set paper in place, close the door, and check that the PAPER EMPTY LED goes off.
- (iii) Check that the Video signal (EIA or CCIR) is input to the VIDEO INPUT terminal.

* Note 1: When the paper is set in place. IC301-⑤⑦“L” This condition is met, IC301 switches off PAPER EMPTY-LED. (IC301-⑥⑩)

* Note 2: IC301-③② is the reset terminal. When the power is first turned on, this pin is held low for a few msec, then set high to end the reset.

5-4-1. Memory write (FETCH) signals from the print key

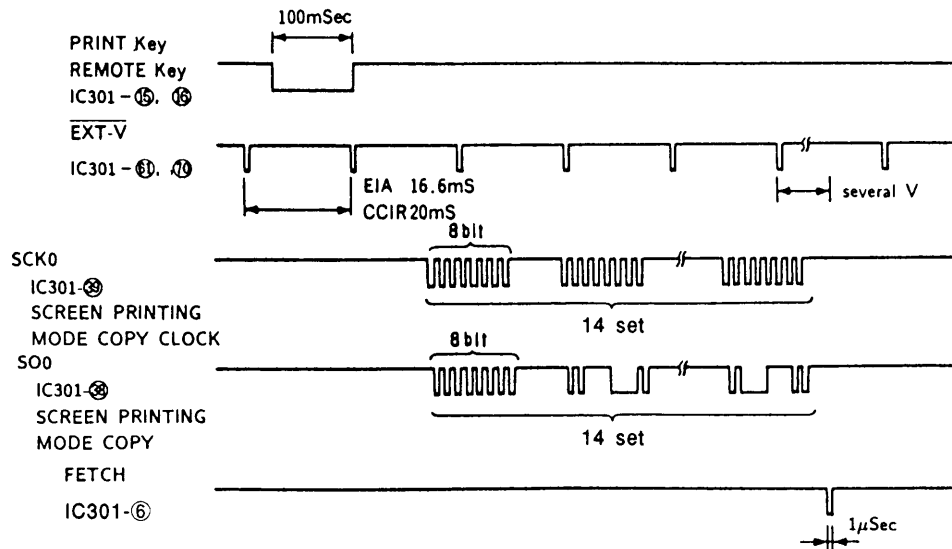


Fig. 5-4. Memory write timing chart

Operation

- (i) When the PRINT key or REMOTE key signal is “L” for about 100 msec, the system enters PRINT MODE.
- (ii) When the system enters PRINT mode, first it verifies $\overline{\text{EXT-V}}$, then it judges whether the format is EIA or CCIR.
- (iii) Once the video format has been judged, the screen print mode data for that format is transferred to IC103-⑦⑩, the SI (serial input) terminal, from the SO0 (serial output) terminal synchronized with the SCK0 (serial clock). This data is eight sets of 8 bits each for a total of 14 set (112 data) bits.
- (iv) A few EXT-V pulses after the data transfer is complete, the memory write timing signal (FETCH) is output. The timing is taken from IC103 and the video signal is recorded into the video memory, IC104.

5-4-2. From memory writing till screen printing

[I] From after memory writing till the $\overline{\text{INT-V}}$ pulse measurement.

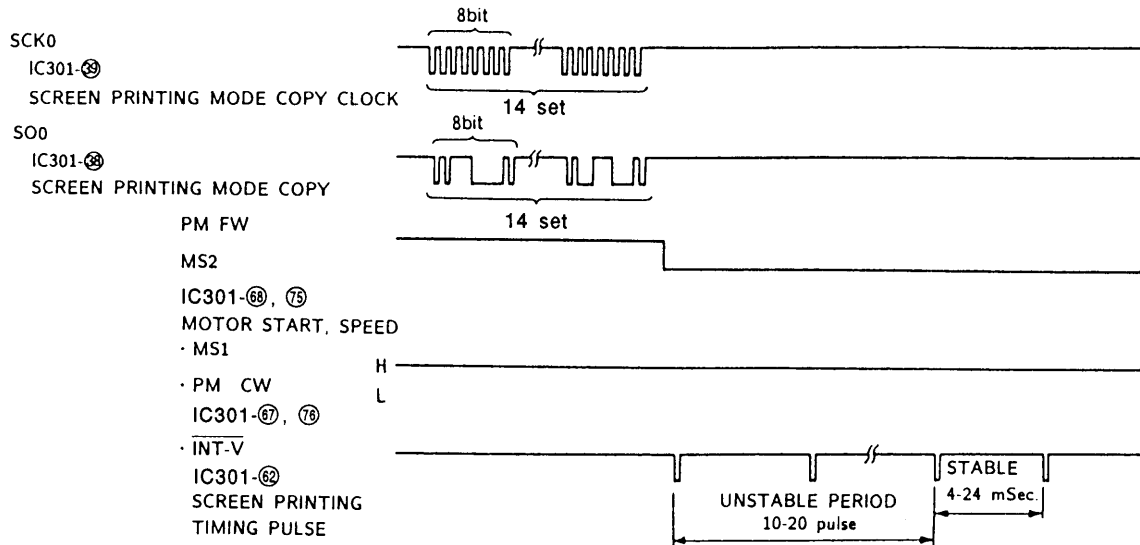


Fig. 5-5. Timing from memory writing till printing

Operation

The data input to the video memory (IC104) with the print key operation is printed with the following procedures :

*Note 1 : The copy key operation is triggered if the copy key is set "L" for at least 100 msec before this operation.

*Note 2 : This operation only occurs if a video signal is input to the video memory.

- (i) Turn the Head U/D motor (IC301-63, 64: "H", "L") and check that the Head goes down (IC301-59, 60: "L", "H"). Then stop the motor (IC301-63, 64: "H", "H"). When the post feed is ON, rewind the paper simultaneously. Turn the platen motor in reverse (IC301-67, 68: "L", "H") to return to the specified position, then stop the platen motor (IC301-67, 68: "H", "H").
- (ii) In order to specify the output format for the data from video memory, it is synchronized with the signal at the SCK0 terminal and the data is copied from the SO0 terminal to IC103-70 (SI terminal).
- (iii) When the data transfer is complete, the motor is rotated, $\overline{\text{INT-V}}$ is generated from IC103-68, and input to IC301-62. The operations of the PM FW (IC301-69), PM CW (IC301-67), MS1 (IC301-75), and MS2 (IC301-75) signals are as follows :

PM FW, PM CW Turn $\overline{\text{ON}}$ /OFF the platen motor
(forward, reverse)

MS1, MS2 Switches HIGH/LOW of the platen motor
speed, between 2 to 4 speed.

Here are the terminal states for each mode.

	PM FW	PM CW	MS1	MS2
STOP	H	H	H	H
3 : 4	L	H	H	L
1 : 1	L	H	L	H
Fast forward	L	H	L	H
Rewind	H	L	L	H

* Note: Since $\overline{\text{INT-V}}$ is made by counting down the FG frequency for the motor servo, if the motor is not turning, it is not output.

- (iv) When the platen motor is turning and the FG pulses are input to IC103-⑥⑤,⑥⑥, $\overline{\text{INT-V}}$ is output from IC301-⑥⑧, and input to IC301-⑥②. Within IC301, $\overline{\text{INT-V}}$ is measured for about 10 to 20 pulses to ensure that $\overline{\text{INT-V}}$ has a fixed pulse width. After verifying that the pulse period is 4 to 24 msec, the system moves to the next screen operation.

[II] From $\overline{\text{INT-V}}$ pulse measurement to screen printing

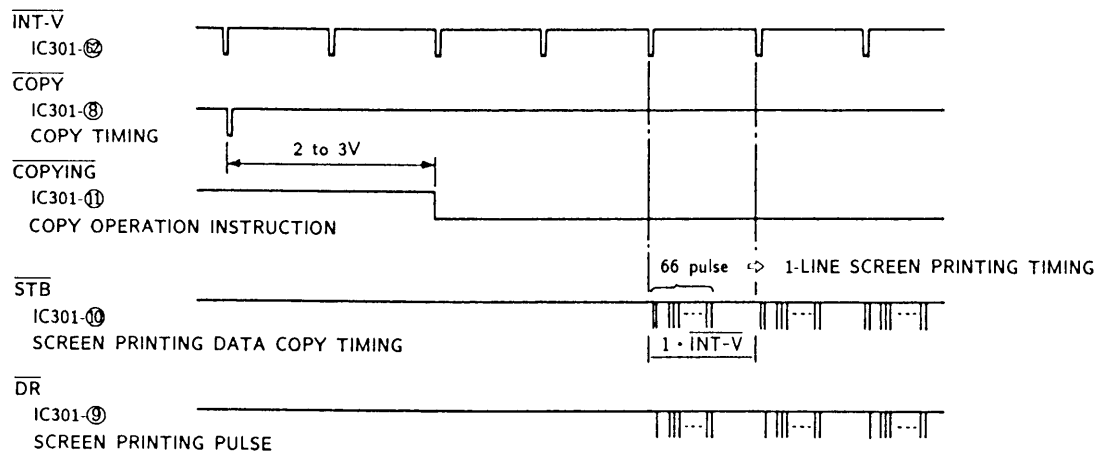


Fig.5-6. Screen Printing Timing

Operation

- When the platen motor rotation is stabilized and the $\overline{\text{INT-V}}$ period is stable, the $\overline{\text{COPY}}$ pulse is output to IC301-⑦⑤ synchronized with $\overline{\text{INT-V}}$.
- When the $\overline{\text{COPY}}$ pulse is input to IC301-⑦⑤, IC103 outputs the $\overline{\text{COPYING}}$ pulse from its pin ⑦② to IC301-⑥② to tell it that IC103 is standing by for screen printing.
- When IC301 verifies that $\overline{\text{COPYING}}$ is "L", it outputs $\overline{\text{STB}}$ and $\overline{\text{DR}}$. The screen printing timing is set by these signals.

*Note: If the period of $\overline{\text{INT-V}}$ fluctuates too greatly during screen printing, printing is stopped.

[III] To the end of screen printing and stopping

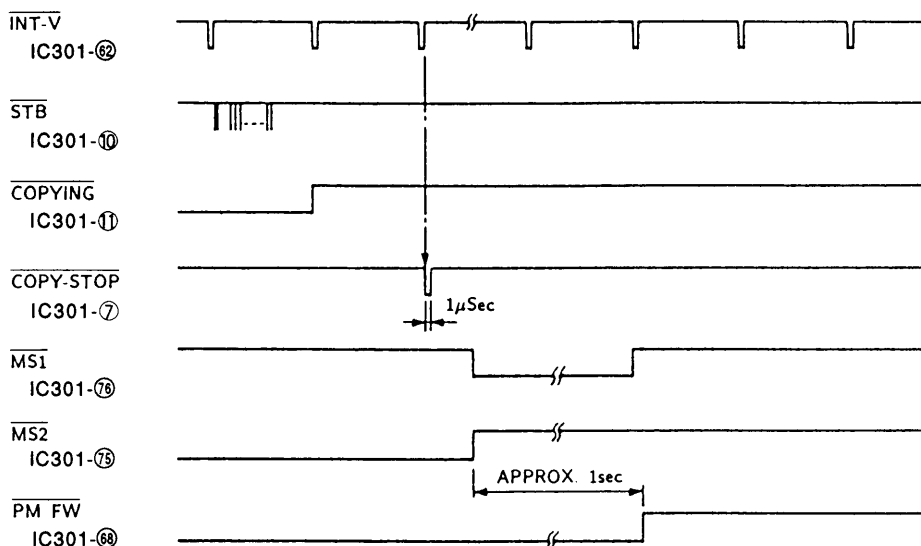


Fig.5-7. End of Screen Printing Timing

Operation

- (i) IC103 counts the printing lines and when the specified number of lines have been printed, it outputs a "H" signal from its IC103-72 to IC301-13, which tells IC301 that the printing operation has ended and it outputs the COPY-STOP pulse.

*Note: The COPY-STOP pulse is also output even if COPYING is "L", if IC 301 judges that something abnormal has arisen. In such a case, when this COPY-STOP pulse is input to IC103, it sets COPYING "H".

This characteristic can be used to analyze any problem that causes printing to stop. If COPY-STOP was issued while COPYING is "L", the cause is related to IC301 screen printint is then stopped. If COPY-STOP was issued while COPYING is "H", the cause is related to IC103.

- (ii) After the COPY-STOP pulse, MS1, MS2 are changed to fast forward for about 1 second, then PM FW is set "H" to stop.

Reverse the Head U/D motor (IC301-63, 64: "L", "H") and check that the Head goes up (IC301-59, 60: "H", "L"). Then stop the motor.
(IC301-63, 64: "H", "H").

5-4-3. Mode set

No. 1 through 4, 6 through 10 of DIP switch S302 on the rear panel are input to IC301 to select each screen printing mode. The mode set is input from IC301-39 to IC103-70 in serial data format when the PRINT key and COPY key are pressed.

Each screen printing mode cannot be selected during screen printing.

5-5. MOTOR DRIVE SECTION (IC201)

The platen motor, Head UP/down motor, and Door motor are driven with IC201, IC202, IC203, and IC204,. They are all controlled by IC301.

5-5-1. Platen motor

The platen motor speed is controlled by IC201(M51970L). The frequency of the FG (optic read out) of the motor section is detected and fed back to IC201, which controls motor drive transistor Q205 to control the speed.

IC204 (M54544AL) can drive the motor in the forward or reverse direction.

The motor is turned ON/OFF and its speed controlled by IC301-~~75~~,~~76~~,~~67~~,~~68~~.
(See the explanation of the system control section.)

Since this unit produces the $\overline{\text{INT-V}}$ signal that provides the screen printing timing by dividing the FG frequency, even if there is some slight fluctuation in the FG frequency, the paper feed distance and printing quality are held constant.

5-5-2. Head U/D motor and DOOR motor

The Head U/D motor and DOOR motor are controlled by IC202 and 203 (both are M54543L). This IC can drive the motor in the forward or reverse direction, and it is controlled by IC301-~~65~~,~~66~~,~~63~~,~~64~~.

Head U/D motor

	IC301- 63	IC301- 64	Operation
DOWN	H	L	goes down the head
UP	L	H	goes up the head
STOP	H	H	locks to motor

Door motor

	IC301- 65	IC301- 66	Operation
OPEN	L	H	Opens the door
CLOSE	H	L	Closes the door

The above motor operation is controlled by detecting the condition of Head and Door with IC301 Pin~~55~~,~~56~~,~~59~~,~~60~~.

Head condition

	IC301- 59	IC301- 60	Condition
Top	L	L	Top position of the head to open the door.
Middle	H	L	Head is at this position except for PRINT
Bottom	L	H	Head is pressed against the platen.

Door condition

	IC301- 55	IC301- 56	Condition
Open	L	H	The door is opened.
Close	H	L	The door is closed.

5-6. THERMAL HEAD SECTION

The thermal head of this unit comprise 1-line of 1024 dots ($64 \text{ bits} \times 16$) and prints out the screen vertically.

5-6-1. Configuration

There are sixteen sets of the assemblise shown below. (The DATA inputs are DATA1 to 16. The other terminals are common.)

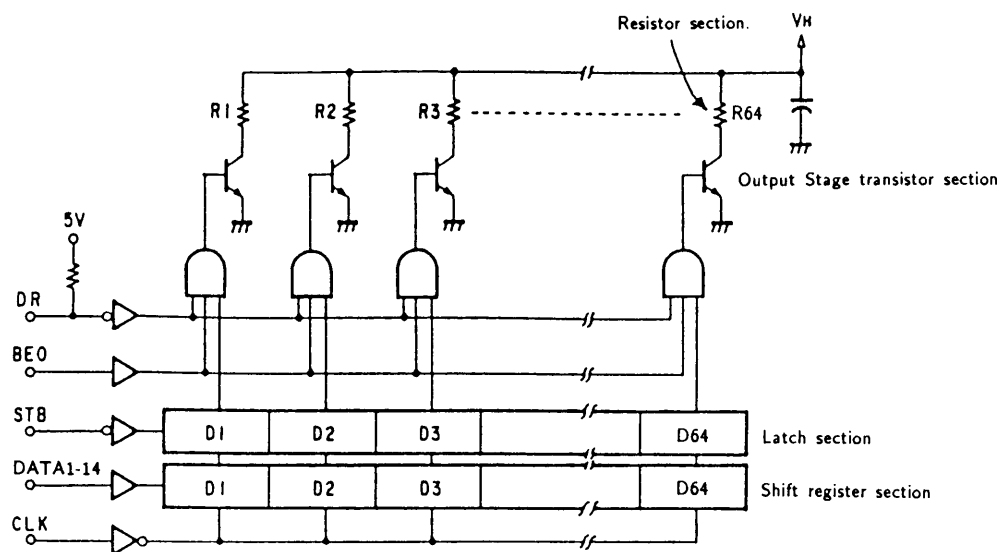


Fig.5-8. Head Internal Circuit Configuration

5-6-2. Timing Chart

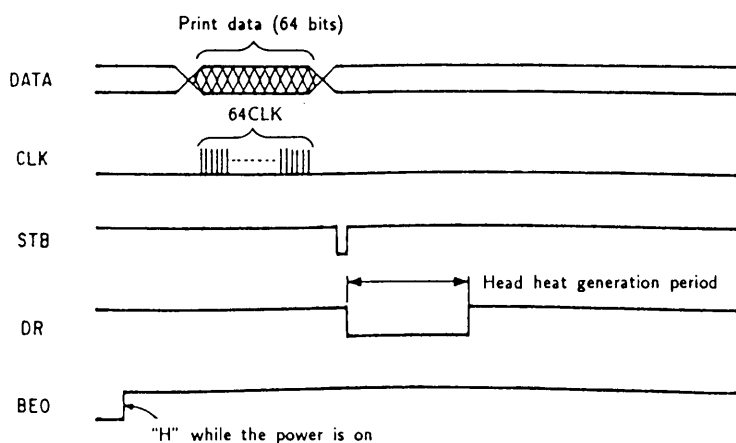


Fig.5-9. Timing Chart

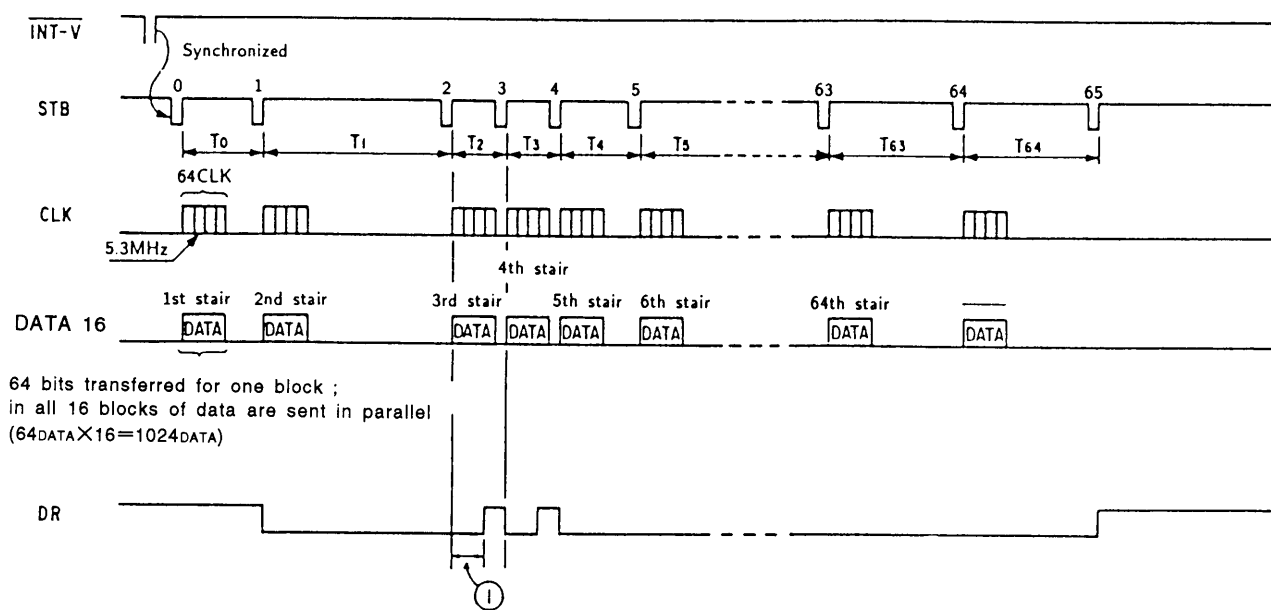


Fig.5-10. Stair Generation

5-6-3. Basic operation

All the signals are input to head from IC103. This section only explains the operations for one block. (The operations for the other blocks are the same.)

- (i) The 64 data items of screen printing are input to the shift register synchronized with CLK.
- (ii) When the STB pulse is input, the data input in (i) is moved from the shift register section to the latch section.
- (iii) When the DR pulse is input, the output stage transistors are switched ON/OFF by the "H" and "L" latch section data. While the transistors are on, the resistors heat up and thermosensitive paper changes color. The amount of heat generated is controlled by varying the length of the DR pulses, so the color darkness of the printing on thermosensitive paper can be varied.

* Note: The BEO terminal goes from "L" to "H" only when the power is turned on. After that it stays "H".

5-6-4. Stair generation

As explained in the last section on basic operation, the darkness of the printing can be controlled with the DR pulses, but it is also possible to change the darkness by changing the high and low data input to the latch section. This section explains this method.

- (i) The data recorded in video memory IC104 during print is input to gradation data generation circuit IC103 by one print line using a picture variable power operation circuit in IC103. The stair data generation circuit outputs the 6 bits of data recorded in IC103 as one of 64 levels. If the 6-bit data is "3", then DATA "H" is sent to the head during the 1st, 2nd, and 3rd stairs of DATA 1 to 6 in Fig.5-10, but from the 4th stairs and later, the DATA "L" is sent.

In this way, the screen is printed with the third stair, but from the fourth stair and later is not printed. (See the explanation of the basic operations in 5-6-3.)

(ii) The data is input to IC103, when the "0" STB pulse synchronized with INT-V is input, the first stair data is sent to the head shift register section synchronized with CLK.

(iii) When the "1" STB pulse is input, the 1st stair data is transferred to the latch section and the 2nd stair data is input to the shift register section. At the same time, the DR pulse goes "L" and the "H" data among the data input as the first stair data switches on the corresponding output stage transistors, heating up the corresponding resistors. The "L" data switches OFF the corresponding output stage transistors so those resistors do not heat up.

This operation is carried out 64 times. If "H" data is sent the 1 through 64 times, the resistors generate heat the entire time and the printing is the blackest possible. If the data is only high until the 32 times, the printing is an intermediate stair. This is how intermediate stairs are generated by sending high data a certain number of times and generating heat in the resistors that many times.

(iv) Thus, by controlling the time until the next data is transferred to the latch, the darkness of intermediate stairs can be achieved simply. In other words, intermediate stair darkness can be controlled by changing the STB intervals, T_0 , T_1 , T_2 , T_3 , T_4 , \dots , T_{63} , T_{64} .

Specifically, IC301 matches the intervals T_1 to T_{64} to the paper's γ characteristic (the degree of darkening relative to the heat applied). This is called γ characteristic control.

(v) If the DR pulse is also controlled as described in 5-6-3, even fine stair can be expressed.

* Note: The section in ① is generated when the STB pulse T interval is $26\mu\text{sec}$.
(The STB pulse T interval is a minimum of $26\mu\text{sec}$.)

Thus, this unit provides smooth expression of intermediate stairs by controlling the STB pulse T interval and the DR pulses.

5-6-5. Temperature compensation

As explained in 5-6-4, intermediate stairs are expressed by controlling the STB pulse T interval and the DR pulses, but since the energy required to make thermosensitive paper turn color varies with the room temperature and with the heat generated by and built up in the printing head during continuous printing.

This unit has a built-in thermistor (CN101-①,②) IC301 measures the change in the head temperature and to compensate for temperature change controls the STB pulse T interval and the DR pulse, just as is done for stair generation. Specifically, when the temperature rises it reduces the STB pulse T interval and the DR pulses, but when the temperature falls, it increases the STB pulse T interval and the DR pulses.

SECTION 6 EXPLODED VIEWS

NOTE:

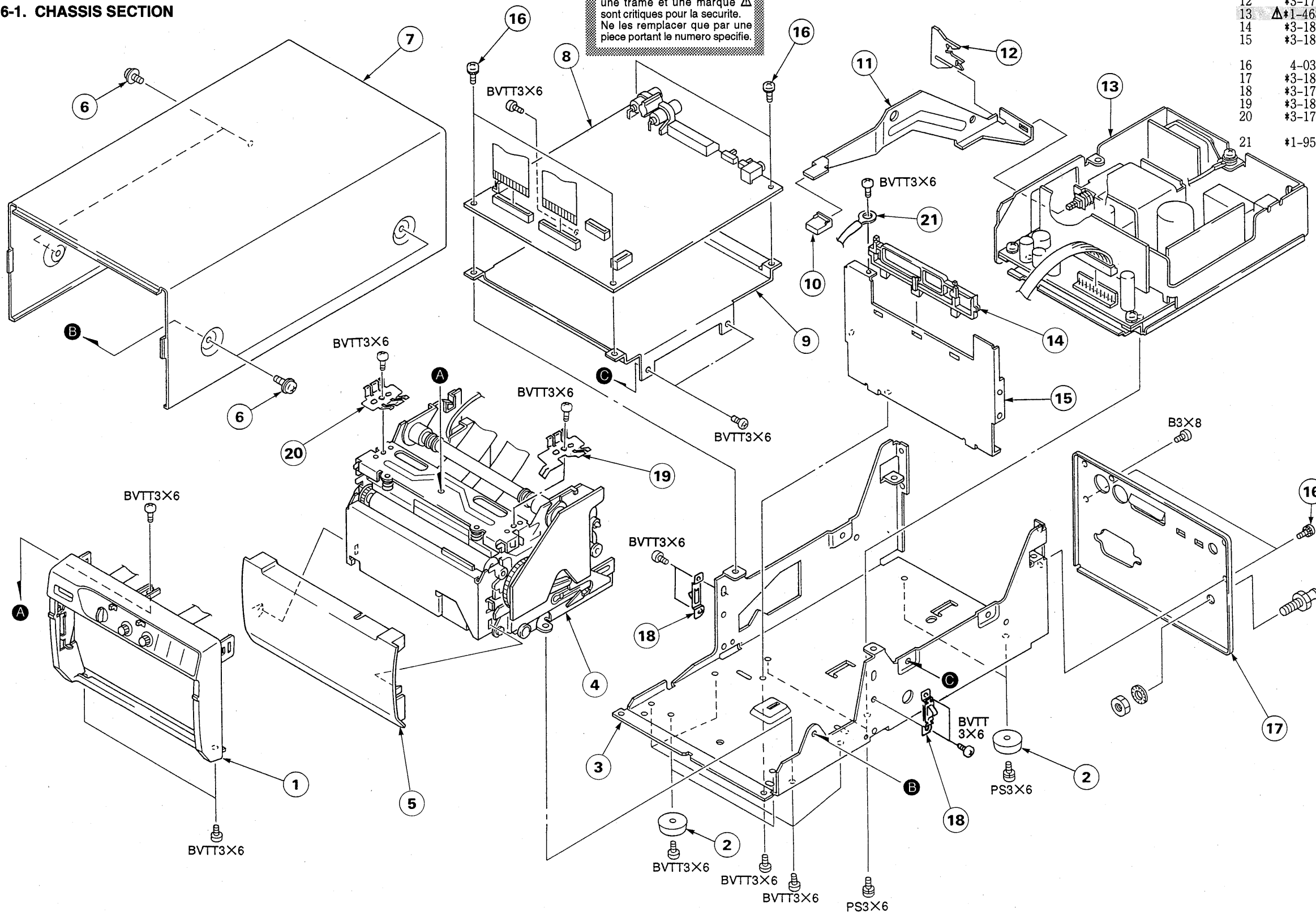
- Items with no part number and no description are not stocked because they are seldom required for routine service.
- The construction parts of an assembled part are indicated with a collation number in the remark column.

- Items marked "*" are not stocked because they are seldom required for routine servicing. Some delay should be expected when ordering these items.

The components identified by shading and mark **Δ** are critical for safety. Replace only with part number specified.

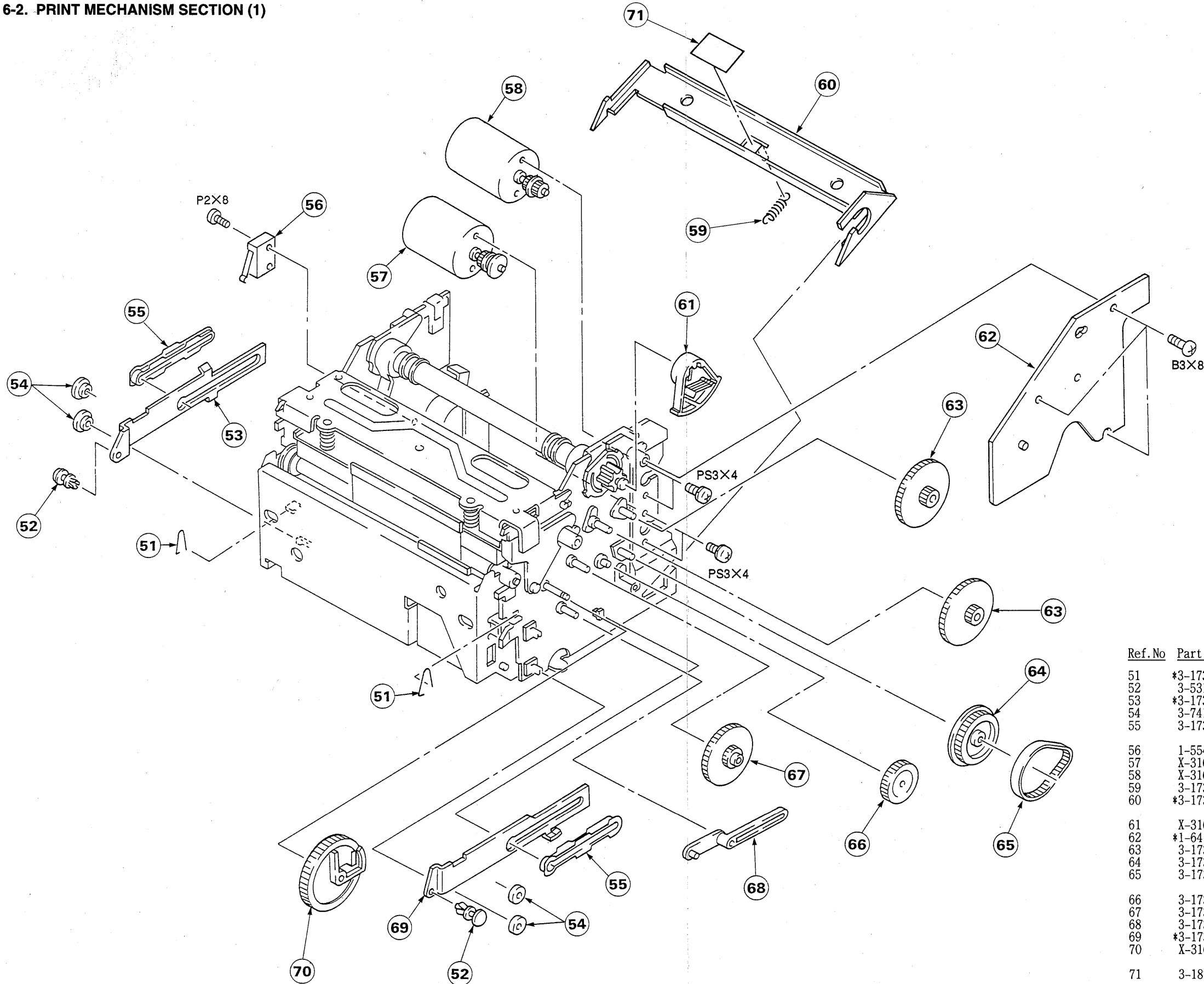
Les composants identifiés par une trame et une marque **Δ** sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

6-1. CHASSIS SECTION



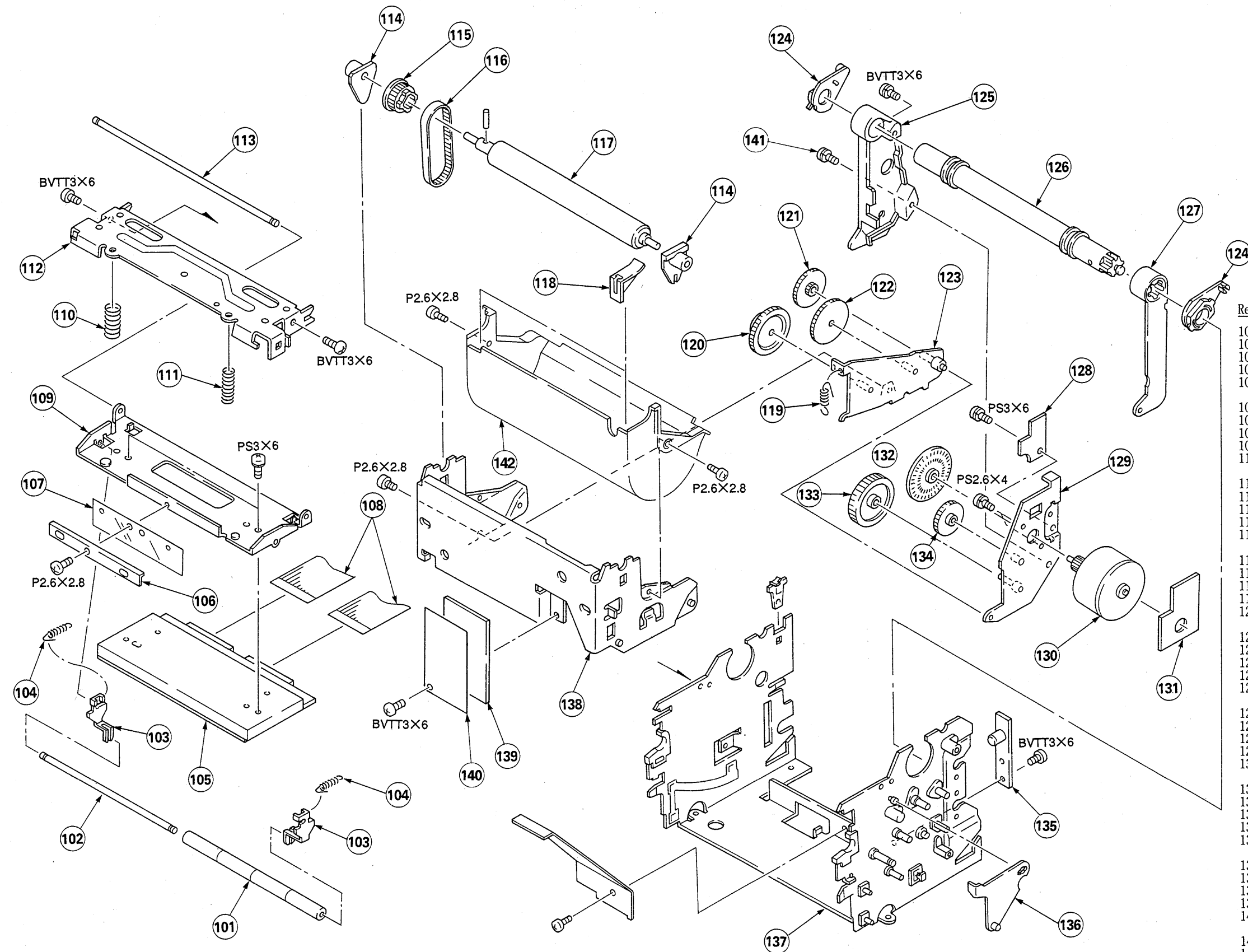
Ref.No	Part No.	Description	Remark
1	1-473-100-11	PANEL UNIT, FRONT	
2	3-734-866-01	FOOT	
3	*3-187-320-01	CHASSIS, FRAME	
4	*A-8265-916-A	BLOCK ASSY, MECHANICAL	
5	3-187-754-11	PANEL, DOOR (UP-890CE)	
6	3-187-754-21	PANEL, DOOR (UP-890MD)	
7	4-886-821-11	SCREW, M3 CASE	
8	*3-187-319-01	COVER, TOP	
9	*A-8265-924-A	COMPLETE PCB, MA-19	
10	*3-187-755-01	PLATE, SHIELD	
11	3-187-313-01	BUTTON, POWER	
12	*3-173-923-03	ROD, POWER SWITCH	
13	*3-173-922-02	STOPPER, ROD	
14	Δ *1-468-002-11	SWITCHING REGULATOR (SOPS-1088)	
15	*3-187-315-01	CLAMP, HARNESS	
16	*3-187-316-01	CHASSIS, CENTER	
17	4-034-937-01	SCREW (M3), TAPPING	
18	*3-187-325-11	PANEL, REAR	
19	*3-176-693-01	PLATE, GROUND (TC)	
20	*3-187-846-01	PLATE, GROUND (F)	
21	*3-174-629-02	PLATE, GROUND	
22	*1-950-127-13	HARNESS (H)	

6-2. PRINT MECHANISM SECTION (1)



Ref.No	Part No.	Description	Remark
51	*3-173-548-02	SPRING, GROUND	
52	3-531-576-11	RIVET	
53	*3-173-554-01	RAIL (L)	
54	3-741-065-01	ROLLER, SLIDE	
55	3-173-558-01	GUIDE, RAIL	
56	1-554-512-00	SWITCH, MICRO	
57	X-3167-435-1	MOTOR ASSY, S GEAR	
58	X-3167-434-1	MOTOR ASSY, DOOR	
59	3-173-559-01	SPRING (LOCK), TENSION	
60	*3-173-981-02	ARM, LOCK	
61	X-3166-380-1	GEAR ASSY, DOOR	
62	*1-641-592-11	PC BOARD SE-9	
63	3-173-550-01	GEAR (D), IDLER	
64	3-173-553-02	PULLEY (H), GEAR	
65	3-173-560-01	BELT, 90TN	
66	3-173-551-01	GEAR (S), IDLER	
67	3-173-549-01	GEAR (H), IDLER	
68	3-173-556-01	LINK, EJECT	
69	*3-173-555-01	RAIL (R), CAM	
70	X-3166-379-1	GEAR ASSY, CAM	
71	3-187-838-01	SHEET PROTECTION	

6-3. PRINT MECHANISM SECTION (2)



Ref. No	Part No.	Description	Remark
101	3-745-319-01	ROLLER, PRESS	
102	*3-173-562-02	SHAFT, PRESS	
103	*3-173-979-01	HOLDER, PRESS	
104	3-173-563-02	SPRING (PRESS), TENSION	
105	1-500-197-11	HEAD, THERMAL (LV5414)	
106	*3-173-564-01	HOLDER, SHEET	
107	*3-174-266-02	SHEET, GUIDE	
108	1-769-536-11	WIRE (FLAT TYPE) (26 CORE)	
109	*3-173-980-01	HOLDER, HEAD	
110	3-173-978-01	SPRING (B), COMPRESSION	
111	3-173-977-02	SPRING (S), COMPRESSION	
112	*3-187-314-01	HOLDER, SPRING	
113	3-173-547-01	SHAFT, HEAD	
114	3-173-579-01	BEARING, PLATEN	
115	3-173-578-02	PULLEY, PLATEN	
116	3-174-267-02	BELT, 110 TN	
117	3-173-615-02	PLATEN	
118	3-741-062-11	STAY, ROLL	
119	3-173-561-01	SPRING (BELT), TENSION	
120	3-173-616-02	PULLEY (P), GEAR	
121	3-173-566-01	GEAR (A)	
122	3-173-581-01	GEAR (G), IDLER	
123	*X-3166-383-4	BRACKET ASSY, GEAR	
124	3-173-557-02	BEARING, ARM	
125	3-173-612-02	ARM (L)	
126	3-173-610-02	PIPE, ARM	
127	3-173-611-01	ARM (R)	
128	*1-655-125-11	PC BOARD SU-20	
129	*X-3166-382-2	BRACKET ASSY, MOTOR	
130	X-3166-426-2	MOTOR ASSY, M GEAR	
131	*1-641-591-11	PC BOARD SE-9	
132	X-3167-651-1	FG UNIT	
133	3-173-565-01	GEAR (M), IDLER	
134	3-173-566-01	GEAR (A)	
135	*1-655-123-11	PC BOARD C-19	
136	*X-3166-434-2	LINK ASSY, HEAD	
137	*X-3166-384-4	CHASSIS (OUTSERT) ASSY, MECH	
138	*3-173-620-01	CHASSIS, INNER	
139	*1-655-124-11	PC BOARD PTC-35	
140	*3-187-939-01	SHEET PROTECTION, PTC	
141	4-034-937-01	SCREW (M3), TAPPING	
142	X-3167-781-1	TRAY ASSY (E), SLIDE (for UC, CE)	
	X-3167-782-1	TRAY ASSY (J), SLIDE (for J)	

Ref.No	Part No.	Description	Remark	Ref.No	Part No.	Description	Remark
Q5	8-729-230-49	TRANSISTOR 2SC2712-YG		R35	1-216-057-00	METAL 2.2K 5%	1/10W
Q6	8-729-230-49	TRANSISTOR 2SC2712-YG		R36	1-216-053-00	METAL 1.5K 5%	1/10W
Q7	8-729-216-22	TRANSISTOR 2SA1162-G		R37	1-216-071-00	METAL 8.2K 5%	1/10W
Q8	8-729-230-49	TRANSISTOR 2SC2712-YG		R38	1-216-061-00	METAL 3.3K 5%	1/10W
Q9	8-729-230-49	TRANSISTOR 2SC2712-YG		R39	1-216-057-00	METAL 2.2K 5%	1/10W
Q10	8-729-230-49	TRANSISTOR 2SC2712-YG		R40	1-216-041-00	METAL 470 5%	1/10W
Q11	8-729-230-49	TRANSISTOR 2SC2712-YG		R41	1-216-041-00	METAL 470 5%	1/10W
Q12	8-729-230-49	TRANSISTOR 2SC2712-YG		R42	1-216-049-00	METAL 1K 5%	1/10W
Q13	8-729-230-49	TRANSISTOR 2SC2712-YG		R43	1-216-045-00	METAL 680 5%	1/10W
Q14	8-729-230-49	TRANSISTOR 2SC2712-YG		R44	1-216-045-00	METAL 680 5%	1/10W
Q15	8-729-216-22	TRANSISTOR 2SA1162-G		R45	1-216-045-00	METAL 680 5%	1/10W
Q16	8-729-230-49	TRANSISTOR 2SC2712-YG		R46	1-216-049-00	METAL 1K 5%	1/10W
Q17	8-729-230-49	TRANSISTOR 2SC2712-YG		R47	1-216-033-00	METAL 220 5%	1/10W
Q18	8-729-230-49	TRANSISTOR 2SC2712-YG		R48	1-216-037-00	METAL 330 5%	1/10W
Q19	8-729-901-00	TRANSISTOR DTC124EK		R49	1-216-049-00	METAL 1K 5%	1/10W
Q20	8-729-230-49	TRANSISTOR 2SC2712-YG		R50	1-216-073-00	METAL 10K 5%	1/10W
Q21	8-729-230-49	TRANSISTOR 2SC2712-YG		R51	1-216-057-00	METAL 2.2K 5%	1/10W
Q22	8-729-230-49	TRANSISTOR 2SC2712-YG		R52	1-216-073-00	METAL 10K 5%	1/10W
Q23	8-729-230-49	TRANSISTOR 2SC2712-YG		R53	1-216-023-00	METAL 82 5%	1/10W
Q201	8-729-901-05	TRANSISTOR DTA124EK		R54	1-216-119-00	METAL 820K 5%	1/10W
Q202	8-729-901-05	TRANSISTOR DTA124EK		R55	1-216-081-00	METAL 22K 5%	1/10W
Q203	8-729-216-22	TRANSISTOR 2SA1162-G		R56	1-216-065-00	METAL 4.7K 5%	1/10W
Q204	8-729-230-49	TRANSISTOR 2SC2712-YG		R57	1-216-055-00	METAL 1.8K 5%	1/10W
Q205	8-729-101-07	TRANSISTOR 2SB798-DL		R58	1-216-073-00	METAL 10K 5%	1/10W
Q206	8-729-140-75	TRANSISTOR 2SD999-CLCK		R59	1-216-045-00	METAL 680 5%	1/10W
Q207	8-729-140-75	TRANSISTOR 2SD999-CLCK		R59	1-216-069-00	METAL 6.8K 5%	1/10W
Q301	8-729-901-00	TRANSISTOR DTC124EK		R60	1-216-049-00	METAL 1K 5%	1/10W
Q302	8-729-900-53	TRANSISTOR DTC114EK		R61	1-216-065-00	METAL 4.7K 5%	1/10W
Q303	8-729-230-49	TRANSISTOR 2SC2712-YG		R62	1-216-041-00	METAL 470 5%	1/10W
Q304	8-729-901-00	TRANSISTOR DTC124EK		R63	1-216-049-00	METAL 1K 5%	1/10W
<RESISTOR>				R64	1-216-063-00	METAL 3.9K 5%	1/10W
R1	1-216-029-00	METAL 150 5%	1/10W	R65	1-216-053-00	METAL 1.5K 5%	1/10W
R2	1-216-029-00	METAL 150 5%	1/10W	R66	1-216-061-00	METAL 3.3K 5%	1/10W
R3	1-216-073-00	METAL 10K 5%	1/10W	R67	1-216-049-00	METAL 1K 5%	1/10W
R4	1-216-073-00	METAL 10K 5%	1/10W	R68	1-216-057-00	METAL 2.2K 5%	1/10W
R5	1-216-025-00	METAL 100 5%	1/10W	R69	1-216-063-00	METAL 3.9K 5%	1/10W
R6	1-216-049-00	METAL 1K 5%	1/10W	R70	1-216-057-00	METAL 2.2K 5%	1/10W
R7	1-216-039-00	METAL 390 5%	1/10W	R71	1-216-021-00	METAL 68 5%	1/10W
R8	1-216-043-91	METAL 560 5%	1/10W	R72	1-216-075-00	METAL 12K 5%	1/10W
R9	1-216-049-00	METAL 1K 5%	1/10W	R73	1-216-067-00	METAL 5.6K 5%	1/10W
R10	1-216-039-00	METAL 390 5%	1/10W	R74	1-216-033-00	METAL 220 5%	1/10W
R11	1-216-043-91	METAL 560 5%	1/10W	R75	1-216-021-00	METAL 68 5%	1/10W
R12	1-216-049-00	METAL 1K 5%	1/10W	R76	1-216-073-00	METAL 10K 5%	1/10W
R13	1-216-025-00	METAL 100 5%	1/10W	R77	1-216-069-00	METAL 6.8K 5%	1/10W
R14	1-216-073-00	METAL 10K 5%	1/10W	R80	1-216-051-00	METAL 1.2K 5%	1/10W
R15	1-216-073-00	METAL 10K 5%	1/10W	R81	1-216-057-00	METAL 2.2K 5%	1/10W
R16	1-216-049-00	METAL 1K 5%	1/10W	R82	1-216-057-00	METAL 2.2K 5%	1/10W
R17	1-216-025-00	METAL 100 5%	1/10W	R83	1-216-071-00	METAL 8.2K 5%	1/10W
R18	1-216-065-00	METAL 4.7K 5%	1/10W	R84	1-216-067-00	METAL 5.6K 5%	1/10W
R20	1-216-095-00	METAL 82K 5%	1/10W	R85	1-216-049-00	METAL 1K 5%	1/10W
R21	1-216-077-00	METAL 15K 5%	1/10W	R86	1-216-051-00	METAL 1.2K 5%	1/10W
R22	1-216-067-00	METAL 5.6K 5%	1/10W	R87	1-216-057-00	METAL 2.2K 5%	1/10W
R23	1-216-077-00	METAL 15K 5%	1/10W	R88	1-216-057-00	METAL 2.2K 5%	1/10W
R24	1-216-069-00	METAL 6.8K 5%	1/10W	R89	1-216-071-00	METAL 8.2K 5%	1/10W
R25	1-216-073-00	METAL 10K 5%	1/10W	R90	1-216-067-00	METAL 5.6K 5%	1/10W
R26	1-216-069-00	METAL 6.8K 5%	1/10W	R91	1-216-049-00	METAL 1K 5%	1/10W
R27	1-216-049-00	METAL 1K 5%	1/10W	R95	1-216-033-00	METAL 220 5%	1/10W
R28	1-216-035-00	METAL 270 5%	1/10W	R98	1-216-313-00	METAL 8.2 5%	1/10W
R29	1-216-071-00	METAL 8.2K 5%	1/10W	R99	1-216-313-00	METAL 8.2 5%	1/10W
R30	1-216-079-00	METAL 18K 5%	1/10W	R101	1-216-121-00	METAL 1M 5%	1/10W
R31	1-216-049-00	METAL 1K 5%	1/10W	R102	1-216-121-00	METAL 1M 5%	1/10W
R32	1-216-049-00	METAL 1K 5%	1/10W	R103	1-216-013-00	METAL 33 5%	1/10W
R33	1-216-071-00	METAL 8.2K 5%	1/10W	R104	1-216-013-00	METAL 33 5%	1/10W
R34	1-216-079-00	METAL 18K 5%	1/10W	R105	1-216-013-00	METAL 33 5%	1/10W
				R106	1-216-025-00	METAL 100 5%	1/10W

Ref.No	Part No.	Description			Remark	Ref.No	Part No.	Description			Remark
R107	1-216-025-00	METAL	100	5%	1/10W	R218	1-216-069-00	METAL	6.8K	5%	1/10W
R108	1-216-037-90	METAL	330	5%	1/10W	R219	1-216-069-00	METAL	6.8K	5%	1/10W
R108	1-216-041-00	METAL	470	5%	1/10W	R220	1-216-069-00	METAL	6.8K	5%	1/10W
R110	1-216-073-00	METAL	10K	5%	1/10W	R221	1-216-001-00	METAL	10	5%	1/10W
R111	1-216-073-00	METAL	10K	5%	1/10W	R222	1-216-001-00	METAL	10	5%	1/10W
R112	1-216-073-00	METAL	10K	5%	1/10W	R223	1-216-001-00	METAL	10	5%	1/10W
R113	1-216-073-00	METAL	10K	5%	1/10W	R224	1-216-001-00	METAL	10	5%	1/10W
R114	1-216-073-00	METAL	10K	5%	1/10W	R300	1-216-065-00	METAL	4.7K	5%	1/10W
R115	1-216-073-00	METAL	10K	5%	1/10W	R301	1-216-061-00	METAL	3.3K	5%	1/10W
R116	1-216-073-00	METAL	10K	5%	1/10W	R302	1-216-037-00	METAL	330	5%	1/10W
R117	1-216-073-00	METAL	10K	5%	1/10W	R303	1-216-037-00	METAL	330	5%	1/10W
R118	1-216-073-00	METAL	10K	5%	1/10W	R304	1-216-051-00	METAL	1.2K	5%	1/10W
R120	1-216-025-00	METAL	100	5%	1/10W	R305	1-216-073-00	METAL	10K	5%	1/10W
R121	1-216-025-00	METAL	100	5%	1/10W	R306	1-216-023-00	METAL	82	5%	1/10W
R122	1-216-025-00	METAL	100	5%	1/10W	R307	1-216-101-00	METAL	150K	5%	1/10W
R123	1-216-025-00	METAL	100	5%	1/10W	R308	1-216-077-00	METAL	15K	5%	1/10W
R124	1-216-025-00	METAL	100	5%	1/10W	R309	1-216-081-00	METAL	22K	5%	1/10W
R125	1-216-025-00	METAL	100	5%	1/10W	R310	1-216-097-00	METAL	100K	5%	1/10W
R126	1-216-025-00	METAL	100	5%	1/10W	R311	1-216-063-00	METAL	3.9K	5%	1/10W
R127	1-216-025-00	METAL	100	5%	1/10W	R312	1-216-073-00	METAL	10K	5%	1/10W
R128	1-216-025-00	METAL	100	5%	1/10W	R313	1-216-073-00	METAL	10K	5%	1/10W
R129	1-216-025-00	METAL	100	5%	1/10W	R314	1-216-049-00	METAL	1K	5%	1/10W
R130	1-216-025-00	METAL	100	5%	1/10W	R315	1-216-049-00	METAL	1K	5%	1/10W
R131	1-216-025-00	METAL	100	5%	1/10W	R316	1-216-037-00	METAL	330	5%	1/10W
R132	1-216-025-00	METAL	100	5%	1/10W	R317	1-216-083-00	METAL	27K	5%	1/10W
R133	1-216-025-00	METAL	100	5%	1/10W	R318	1-216-067-00	METAL	5.6K	5%	1/10W
R134	1-216-025-00	METAL	100	5%	1/10W	R319	1-216-061-00	METAL	3.3K	5%	1/10W
R135	1-216-025-00	METAL	100	5%	1/10W	R320	1-216-061-00	METAL	3.3K	5%	1/10W
R136	1-216-025-00	METAL	100	5%	1/10W	R321	1-216-033-00	METAL	220	5%	1/10W
R137	1-216-025-00	METAL	100	5%	1/10W	R322	1-216-061-00	METAL	3.3K	5%	1/10W
R138	1-216-025-00	METAL	100	5%	1/10W	R323	1-216-025-00	METAL	100	5%	1/10W
R139	1-216-025-00	METAL	100	5%	1/10W	R324	1-216-025-00	METAL	100	5%	1/10W
R140	1-216-025-00	METAL	100	5%	1/10W	R325	1-216-041-00	METAL	470	5%	1/10W
R141	1-216-025-00	METAL	100	5%	1/10W	R326	1-216-055-00	METAL	1.8K	5%	1/10W
R142	1-216-025-00	METAL	100	5%	1/10W	R329	1-216-073-00	METAL	10K	5%	1/10W
R143	1-216-025-00	METAL	100	5%	1/10W	R330	1-216-073-00	METAL	10K	5%	1/10W
R144	1-216-025-00	METAL	100	5%	1/10W	R331	1-216-049-00	METAL	1K	5%	1/10W
R145	1-216-025-00	METAL	100	5%	1/10W	R332	1-216-049-00	METAL	1K	5%	1/10W
R146	1-216-025-00	METAL	100	5%	1/10W	R333	1-216-049-00	METAL	1K	5%	1/10W
R147	1-216-025-00	METAL	100	5%	1/10W	R334	1-216-049-00	METAL	1K	5%	1/10W
R148	1-216-025-00	METAL	100	5%	1/10W	R335	1-216-073-00	METAL	10K	5%	1/10W
R149	1-216-295-91	CONDUCTOR 2012				R336	1-216-073-00	METAL	10K	5%	1/10W
R150	1-216-295-91	CONDUCTOR 2012				R337	1-216-073-00	METAL	10K	5%	1/10W
R151	1-216-295-91	CONDUCTOR 2012				R338	1-216-073-00	METAL	10K	5%	1/10W
R152	1-216-295-91	CONDUCTOR 2012				R339	1-216-073-00	METAL	10K	5%	1/10W
R153	1-216-025-00	METAL	100	5%	1/10W	R340	1-216-073-00	METAL	10K	5%	1/10W
R154	1-216-025-00	METAL	100	5%	1/10W	R341	1-216-073-00	METAL	10K	5%	1/10W
R156	1-216-295-91	CONDUCTOR 2012				R342	1-216-073-00	METAL	10K	5%	1/10W
R157	1-216-295-91	CONDUCTOR 2012				R343	1-216-073-00	METAL	10K	5%	1/10W
R201	1-216-099-00	METAL	120K	5%	1/10W	R346	1-216-073-00	METAL	10K	5%	1/10W
R202	1-216-091-00	METAL	56K	5%	1/10W	R347	1-216-073-00	METAL	10K	5%	1/10W
R203	1-216-081-00	METAL	22K	5%	1/10W	R348	1-216-073-00	METAL	10K	5%	1/10W
R204	1-216-013-00	METAL	33	5%	1/10W	R349	1-216-842-01	RESISTOR, CHIP	56K	1/16W (1608	
R205	1-216-093-00	METAL	68K	5%	1/10W	R350	1-216-842-01	RESISTOR, CHIP	56K	1/16W (1608	
R206	1-216-033-00	METAL	220	5%	1/10W	R351	1-216-842-01	RESISTOR, CHIP	56K	1/16W (1608	
R207	1-216-057-00	METAL	2.2K	5%	1/10W	R352	1-216-842-01	RESISTOR, CHIP	56K	1/16W (1608	
R208	1-216-059-00	METAL	2.7K	5%	1/10W	R353	1-216-073-00	METAL	10K	5%	1/10W
R210	1-216-295-91	CONDUCTOR 2012				R354	1-216-073-00	METAL	10K	5%	1/10W
R211	1-216-045-00	METAL	680	5%	1/10W	R355	1-216-073-00	METAL	10K	5%	1/10W
R212	1-216-308-00	METAL	4.7	5%	1/10W	R356	1-216-073-00	METAL	10K	5%	1/10W
R213	1-216-308-00	METAL	4.7	5%	1/10W	R361	1-216-049-00	METAL	1K	5%	1/10W
R214	1-216-049-00	METAL	1K	5%	1/10W	R362	1-216-049-00	METAL	1K	5%	1/10W
R215	1-216-055-00	METAL	1.8K	5%	1/10W	R363	1-216-049-00	METAL	1K	5%	1/10W
R216	1-216-061-00	METAL	3.3K	5%	1/10W	R364	1-216-049-00	METAL	1K	5%	1/10W
R217	1-216-065-00	METAL	4.7K	5%	1/10W	R365	1-216-049-00	METAL	1K	5%	1/10W

The components identified by shading and mark **▲** are critical for safety.
Replace only with part number specified.

Les composants identifiés par une trame et une marque **▲** sont critiques pour la sécurité.
Ne les remplacer que par une pièce portant le numéro spécifié.

MA-19 **PTC-35** **SE-9** **SU-20**

SWITCHING REGULATOR

Ref.No	Part No.	Description	Remark
R366	1-216-049-00	METAL 1K 5%	1/10W
R367	1-216-049-00	METAL 1K 5%	1/10W
R368	1-216-049-00	METAL 1K 5%	1/10W
R369	1-216-049-00	METAL 1K 5%	1/10W
R370	1-216-049-00	METAL 1K 5%	1/10W
R371	1-216-073-00	METAL 10K 5%	1/10W
R372	1-216-073-00	METAL 10K 5%	1/10W
R373	1-216-073-00	METAL 10K 5%	1/10W
R374	1-216-073-00	METAL 10K 5%	1/10W
R375	1-216-073-00	METAL 10K 5%	1/10W
R376	1-216-073-00	METAL 10K 5%	1/10W
R377	1-216-073-00	METAL 10K 5%	1/10W
R378	1-216-073-00	METAL 10K 5%	1/10W
R379	1-216-073-00	METAL 10K 5%	1/10W
R380	1-216-073-00	METAL 10K 5%	1/10W
R381	1-412-390-21	CONDUCTOR 0UH	
R382	1-412-390-21	CONDUCTOR 0UH	
<VARIABLE RESISTOR>			
RV1	1-241-175-11	RES, ADJ, CERMET 220	
RV2	1-238-090-11	RES, ADJ, CERMET 10K	
RV201	1-241-092-11	RES, ADJ, CERMET 47K	
<RELAY>			
RY1	1-515-614-11	RELAY	
<SWITCH>			
S301	1-572-999-11	SWITCH, SLIDE	
S302	1-762-299-11	SWITCH, DIP (PIANO TYPE)	
S303	1-572-999-11	SWITCH, SLIDE	
<CRYSTAL>			
X101	1-760-094-11	VIBRATOR, CRYSTAL	
X301	1-579-125-11	VIBRATOR, CERAMIC	

	*1-655-124-11	PTC-35 BOARD	*****
	3-187-312-01	HOLDER (P), LED	
<CAPASITOR>			
C501	1-163-038-91	CERAMIC 0.1uF	25V
C502	1-163-038-91	CERAMIC 0.1uF	25V
<CONNECTOR>			
CN501	*1-949-469-11	HARNESS (C)	
<TRANSISTOR>			
Q501	8-719-988-59	TRANSISTOR PT501A	
Q502	8-729-019-26	TRANSISTOR PT493F	
<RESISTOR>			
R501	1-216-025-00	METAL 100 5%	1/10W
R502	1-216-013-00	METAL 33 5%	1/10W
R503	1-216-295-91	CONDUCTOR 2012	

	*1-641-592-11	SE-9 BOARD	*****
SUM3	1-690-506-11	CORE, FLAT TYPE (7 CORE)	

Ref.No	Part No.	Description	Remark
	*1-655-125-11	SU-20 BOARD	*****
<CONNECTOR>			
CN601	1-506-481-11	PIN, CONNECTOR 2P	

	▲*1-468-002-11	SWITCHING REGULATOR (SOPS-1088)	*****
	*2-409-035-01	CASE, ASSY	
	*1-954-340-11	HARNESS	
	*1-655-574-11	C BOARD	*****
<CAPACITOR>			
C181	1-137-169-00	FILM 0.22uF	50V
C182	1-136-153-00	FILM 0.01uF	50V
C183	1-130-471-00	FILM 1000PF	50V
C184	1-137-171-00	FILM 0.33uF	50V
C185	1-124-478-11	ELECT 100uF	25V
C601	1-164-331-91	CERAMIC 470PF	500V
C602	1-164-331-91	CERAMIC 470PF	500V
C607	1-136-165-00	FILM 0.1uF	50V
C611	1-136-165-00	FILM 0.1uF	50V
C612	1-137-171-00	FILM 0.33uF	50V
C616	1-136-153-00	FILM 0.01uF	50V
C617	1-136-165-00	FILM 0.1uF	50V
C618	1-136-153-00	FILM 0.01uF	50V
C619	1-130-012-00	FILM 330PF	50V
C620	1-136-165-00	FILM 0.1uF	50V
C621	1-136-153-00	FILM 0.01uF	50V
<CONNECTOR>			
CN102	*1-770-420-11	CONNECTOR 9P	
CN103	*1-770-420-11	CONNECTOR 9P	
<DIODE>			
D1	8-719-210-21	DIODE 11EQS04	
D601	8-719-210-21	DIODE 11EQS04	
D602	8-719-210-21	DIODE 11EQS04	
D603	8-719-911-19	DIODE 1SS119	
D605	8-719-929-15	DIODE HZS9.1NB2	
D606	8-719-986-73	DIODE RB441QT-77	
D607	8-719-986-73	DIODE RB441QT-77	
D610	8-719-929-72	DIODE HZS33NB2	
<IC>			
IC101	8-759-112-09	IC UPC78N12H	
IC102	8-759-332-30	IC MC34262P	
IC103	8-759-332-29	IC M51945BL	
IC601	8-759-298-87	IC CXA8038P	
<TRANSISTOR>			
Q151	8-729-199-82	TRANSISTOR 2SD774-2	
Q601	8-729-205-02	TRANSISTOR 2SB810-H	
Q602	8-729-205-02	TRANSISTOR 2SB810-H	
Q603	8-729-199-82	TRANSISTOR 2SD774-2	
Q604	8-729-900-80	TRANSISTOR DTC114ES	
<RESISTOR>			
R181	1-247-863-91	CARBON 22K	1/4W
R182	1-249-431-11	CARBON 15K	1/4W
R183	1-249-401-11	CARBON 47	1/4W

SWITCHING REGULATOR

Ref.No	Part No.	Description	Remark	Ref.No	Part No.	Description	Remark
R184	1-249-427-11	CARBON 6.8K	1/4W			<IC>	
R185	1-249-437-11	CARBON 47K	1/4W	IC201	8-759-991-16	IC BA10358	
R186	1-249-441-11	CARBON 100K	1/4W	IC203	8-759-321-95	IC HA17431PA	
R187	1-247-425-11	CARBON 4.7K	1/4W	IC301	8-759-332-12	IC HA16114P	
R601	1-249-389-11	CARBON 4.7	1/4W	IC401	8-759-332-12	IC HA16114P	
R602	1-247-425-11	CARBON 4.7K	1/4W			<TRANSISTOR>	
R603	1-249-389-11	CARBON 4.7	1/4W	Q202	8-729-119-78	TRANSISTOR 2SC2785TP-J	
R604	1-247-425-11	CARBON 4.7K	1/4W			<RESISTOR>	
R605	1-247-791-91	CARBON 22	1/4W	R1	1-249-429-11	CARBON 10K	1/4W
R615	1-247-423-11	CARBON 3.3K	1/4W	R2	1-249-417-11	CARBON 1K	1/4W
R616	1-247-421-11	CARBON 2.2K	1/4W	R3	1-215-449-00	METAL OXIDE 15K	1/4W
R617	1-249-432-11	CARBON 18K	1/4W	R205	1-249-429-11	CARBON 10K	1/4W
R618	1-247-425-11	CARBON 4.7K	1/4W	R206	1-249-425-11	CARBON 4.7K	1/4W
R619	1-247-421-11	CARBON 2.2K	1/4W	R207	1-249-413-11	CARBON 470	1/4W
R620	1-249-426-11	CARBON 5.6K	1/4W	R208	1-249-413-11	CARBON 470	1/4W
R624	1-249-429-11	CARBON 10K	1/4W	R209	1-249-425-11	CARBON 4.7K	1/4W
R630	1-247-425-11	CARBON 4.7K	1/4W	R210	1-249-425-11	CARBON 4.7K	1/4W
R640	1-247-887-00	CARBON 220K	1/4W	R214	1-249-429-11	CARBON 10K	1/4W
R641	1-249-431-11	CARBON 15K	1/4W	R215	1-249-435-11	CARBON 33K	1/4W
		<VARIABLE RESISTOR>		R217	1-215-451-00	METAL OXIDE 18K	1/4W
RV1	1-237-503-21	RES, VER, CARBON 10K		R219	1-215-457-00	METAL OXIDE 33K	1/4W
RV601	1-237-445-11	RES, VER, CARBON 5.0K		R223	1-215-443-00	METAL OXIDE 8.2K	1/4W
		<TRANSFORMER>		R228	1-247-903-00	CARBON 1M	1/4W
T601	1-426-931-11	TRANSFORMER		R250	1-215-437-00	METAL OXIDE 4.7K	1/4W
	1-655-575-11	D BOARD		R251	1-215-437-00	METAL OXIDE 4.7K	1/4W
	*****			R311	1-124-857-91	CARBON 12K	1/4W
	*1-949-413-11	HARNES HA-APS28-C		R312	1-249-441-11	CARBON 100K	1/4W
		<CAPASITOR>		R315	1-215-446-00	METAL OXIDE 11K	1/4W
C207	1-124-910-11	ELECT 47uF	50V	R316	1-215-451-00	METAL OXIDE 18K	1/4W
C210	1-124-122-11	ELECT 100uF	50V	R317	1-249-421-11	CARBON 2.2K	1/4W
C211	1-124-910-11	ELECT 47uF	50V	R318	1-247-893-11	CARBON 390K	1/4W
C214	1-136-165-00	FILM 0.1uF	50V	R321	1-249-409-11	CARBON 220	1/4W
C215	1-130-475-00	FILM 2200PF	50V	R401	1-215-446-00	METAL OXIDE 11K	1/4W
C311	1-130-016-00	FILM 680PF	50V	R402	1-215-451-00	METAL OXIDE 18K	1/4W
C312	1-161-925-00	CERAMIC 100PF	500V	R403	1-249-421-11	CARBON 2.2K	1/4W
C313	1-136-165-00	FILM 0.1uF	50V	R404	1-247-893-11	CARBON 390K	1/4W
C314	1-124-910-11	ELECT 47uF	50V	R407	1-249-409-11	CARBON 220	1/4W
C315	1-124-927-11	ELECT 4.7uF	50V	R409	1-249-441-11	CARBON 100K	1/4W
C316	1-130-481-00	FILM 6800PF	50V				
C317	1-124-910-11	ELECT 47uF	50V	*1-655-667-11	I BOARD		
C322	1-162-117-00	CERAMIC 100PF			*****		
C401	1-136-165-00	FILM 0.1uF	50V		1-533-217-31	FUSE HOLDER	
C402	1-124-927-11	ELECT 4.7uF	50V		1-533-217-31	FUSE HOLDER	
C403	1-124-927-11	ELECT 4.7uF	50V		1-580-375-11	3P INLET 250V 10A	
C404	1-130-481-00	FILM 6800PF	50V			<FUSE>	
C405	1-124-910-11	ELECT 47uF	50V	F101	1-576-231-11	H.B.C FUSE 4A 250V	
C407	1-130-479-00	FILM 4700PF	50V	F102	1-576-231-11	H.B.C FUSE 4A 250V	
C411	1-162-117-00	CERAMIC 100PF					
		<CONNECTOR>		*1-655-573-12	M BOARD		
CNP1	*1-770-420-11	CONNECTOR 9P			*****		
CNP201	*1-770-419-11	CONNECTOR 6P			<CAPASITOR>		
		<DIODE>		C101	1-107-973-11	FILM 0.22uF	250V
D203	8-719-982-20	DIODE HZS30NB2		C104	1-107-973-11	FILM 0.22uF	250V
D205	8-719-911-19	DIODE 1SS119		C105	1-161-742-00	CERAMIC 2200PF	400V
D206	8-719-010-38	DIODE HZS5.1NB2		C108	1-161-973-00	CERAMIC 220PF	400V
D304	8-719-930-85	DIODE HZS12NB3		C110	1-161-973-00	CERAMIC 220PF	400V
D404	8-719-110-13	DIODE HZS9.1NB2		C113	1-110-652-11	FILM 0.015uF	700V
				C115	1-136-153-00	FILM 0.01uF	
				C116	1-136-153-00	FILM 0.01uF	

SWITCHING REGULATOR

Ref.No	Part No.	Description	Remark	Ref.No	Part No.	Description	Remark
C118	1-130-471-00	FILM 1000PF	50V	<RESISTOR>			
C119	1-130-471-00	FILM 1000PF	50V	R101	1-260-134-11	CARBON 820K	1/2W
C122	1-161-742-00	CERAMIC 2200PF	400V	R107	1-249-417-11	CARBON 1K	1/4W
C126	1-124-122-11	ELECT 100uF	50V	R109	1-247-901-11	CARBON 820K	1/4W
C130	1-107-785-11	FILM 0.47MF		R110	1-247-901-11	CARBON 820K	1/4W
C151	1-110-650-11	ELECT 180uF	450V	R111	1-215-902-11	METAL 47K	2W
C152	1-107-787-11	FILM 0.22MF		R112	1-215-902-11	METAL 47K	2W
C153	1-107-785-11	FILM 0.47MF		R113	1-247-863-91	CARBON 22K	1/4W
C154	1-107-785-11	FILM 0.47MF		R114	1-247-863-91	CARBON 22K	1/4W
C193	1-136-153-00	FILM 0.01uF		R115	1-216-361-00	METAL 0.22	2W
C201	1-110-608-11	ELECT 1500uF	35V	R116	1-216-361-00	METAL 0.22	2W
C202	1-110-608-11	ELECT 1500uF	35V	R117	1-247-901-11	CARBON 820K	1/4W
C203	1-164-477-91	CERAMIC 1000PF	500V	R118	1-249-399-11	CARBON 33	1/4W
C205	1-126-104-11	ELECT 470uF	35V	R119	1-218-642-11	METAL 100K	1W
C223	1-164-477-91	CERAMIC 1000PF	500V	R120	1-218-642-11	METAL 100K	1W
C318	1-124-604-00	ELECT 330uF	10V	R129	1-247-791-91	CARBON 22	1/4W
C321	1-124-472-11	ELECT 470uF	10V	R131	1-218-191-11	METAL 0.1	1W
C408	1-124-600-00	ELECT 270uF	25V	R132	1-247-901-11	CARBON 820K	1/4W
C410	1-124-480-11	ELECT 470uF	25V	R133	1-247-901-11	CARBON 820K	1/4W
<CONNECTOR>				R134	1-247-901-11	CARBON 820K	1/4W
CN101	*1-560-549-00	PIN (WITH V CONNECTOR BASE)		R140	1-219-213-11	FUSE 0.033	0.33W
CN202	*1-560-890-00	CONNECTOR PIN 2P		R141	1-249-397-11	CARBON 22	1/4W
<DIODE>				R236	1-215-861-00	METAL 47	1W
D101	8-719-510-22	DIODE D3SB60		R280	1-249-425-11	CARBON 4.7K	1/4W
D102	8-719-200-92	DIODE 11EQS10		R320	1-218-191-11	METAL 0.1	1W
D103	8-719-982-20	DIODE HZS30NB2		R322	1-215-445-00	METAL 10K	1/4W
D104	8-719-313-16	DIODE AU02A		R323	1-215-445-00	METAL 10K	1/4W
D105	8-719-313-16	DIODE AU02A		R330	1-247-887-00	CARBON 220K	1/4W
D110	8-719-029-04	DIODE D5L60		R331	1-247-887-00	CARBON 220K	1/4W
D201	8-719-050-57	DIODE F25P09QS		R350	1-218-191-11	METAL 0.1	1W
D202	8-719-050-57	DIODE F25P09QS		R406	1-218-191-11	METAL 0.1	1W
D301	8-719-052-37	DIODE F10P04Q		R410	1-215-445-00	METAL 10K	1/4W
D302	8-719-120-78	DIODE HZS6.2NB2		R411	1-215-428-00	METAL 2K	1/4W
D303	8-719-911-19	DIODE 1SS119		R450	1-218-191-11	METAL 0.1	1W
D401	8-719-052-37	DIODE F10P04Q		<VARIABLE RESISTOR>			
D402	8-719-110-49	DIODE HZS18NB2		RV201	1-237-445-11	RES, VER, CARBON 5.0K	
D403	8-719-911-19	DIODE 1SS119		<SWITCH>			
<COIL>				S101	1-554-880-11	PUSH SWITCH (AC POWER) (1 KEY)	
L1	1-424-482-11	COIL (SN8D-500)		<TRANSFORMER>			
L2	1-424-482-11	COIL (SN8D-500)		T101	1-427-821-11	TRANSFORMER	
L101	1-411-186-11	COIL, CHOKE PQ-2625		<THERMISTOR>			
L301	1-411-185-11	COIL, CHOKE 50uH		TH101	1-809-430-11	THERMISTOR 10D-11	
L302	1-424-255-11	COIL, CHOKE 10uH		<VARISTOR>			
L401	1-411-185-11	COIL, CHOKE 50uH		V101	1-519-470-11	DISCHARGE	
L402	1-424-255-11	COIL, CHOKE 10uH		VDR101	1-809-337-11	VARISTOR	
<FILTER>				<SWITCH>			
LF102	1-423-740-11	LFT HR-28-E702		TS201	1-570-258-22	SWITCH, THERMAL REED	
LF103	1-421-622-11	TRANS, LINE FILTER S3-3082		*****			
<PHOTO INTERRUPTER>							
PH101	8-749-010-64	PHOTO COUPLER PC123FY2					
PH102	8-749-010-64	PHOTO COUPLER PC123FY2					
<TRANSISTOR>							
Q101	8-729-024-28	TRANSISTOR 2SK2234					
Q102	8-729-024-28	TRANSISTOR 2SK2234					
Q103	8-729-024-28	TRANSISTOR 2SK2234					
Q302	8-729-322-37	TRANSISTOR 2SJ175					
Q401	8-729-322-37	TRANSISTOR 2SJ175					

The components identified by shading and mark **▲** are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque **▲** sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Ref.No Part No. Description Remark

<MISCELLANEOUS>

▲#1-468-002-11 SWITCHING REGULATOR (SOPS-1088)
 1-500-197-11 HEAD, THERMAL (LV5414)
 1-554-512-00 SWITCH, MICRO
 1-769-536-11 WIRE (FLAT TYPE) (26 CORE)
 *1-949-468-11 HARNESS (B)
 *1-949-471-11 HARNESS (E)

<ACCESSORY & PACKING MATERIALS>

1-551-475-31 CABLE ASSY
 ▲1-551-631-22 CORD, POWER (UP-890CE)
 ▲1-558-527-11 CORD, POWER (UP-890MD)
 1-693-002-11 REMOTE COMMANDER (RM-91) (UP-890MD)
 *3-173-904-02 CUSHION
 *3-187-322-01 INDIVIDUAL CARTON (UP-890CE)
 *3-187-324-01 INDIVIDUAL CARTON (UP-890MD)
 3-798-008-11 MANUAL, INSTRUCTION (UP-890CE)
 ▲3-798-008-11 MANUAL, INSTRUCTION (UP-890MD)

<HARDWARE LIST>

7-621-255-55 SCREW +P 2X8
 7-627-556-08 SCREW +P 2.6X2.8
 7-628-253-95 SCREW +PS 2.6X4
 7-682-645-04 SCREW +PS 3X4
 7-682-647-01 SCREW +PS 3X6
 7-685-546-14 SCREW +BTP 3X8 TYPE2 N-S
 7-685-546-19 SCREW +BTP 3X8 TYPE2 N-S
 7-685-871-01 SCREW +BVTT 3X6 (S)

Ref.No Part No. Description Remark

MA board Part No. against the Serial No. for the set.

	Serial No.	Part No.
UP-890CE	16501 through 25100	1-655-122-21, 22
	25101 and Higher	1-655-122-23
UP-890MD	15801~29100	1-655-122-21, 22
	29101 and Higher	1-655-122-23

**THIS NOTE IS COMMON FOR PRINTED WIRING
BOARDS AND SCHEMATIC DIAGRAMS.**

(In addition to this, the necessary note is printed
in each block.)

- **For Schematic Diagrams.**
- Caution when replacing chip parts.
New parts must be attached after removal of chip.
Be careful not to heat the minus side of tantalum capacitor,
because it is damaged by the heat.
- All resistors are in ohms, 1/10W unless otherwise noted.
k Ω : 1000 Ω , M Ω : 1000k Ω .
- All capacitors are in μ F unless otherwise noted.
pF: μ μ F.
50V or less are not indicated except for electrolytics and
tantalums.
- NM: No Mount.

**Note: The components identified by mark Δ are
critical for safety. Replace only with part
number specified.**

**Note: Les composants identifiés par une marque Δ
sont d'une importance critique pour la sécurité.
Ne les remplacer que par des pièces de
numéro spécifié.**

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

A

B

C

D

E

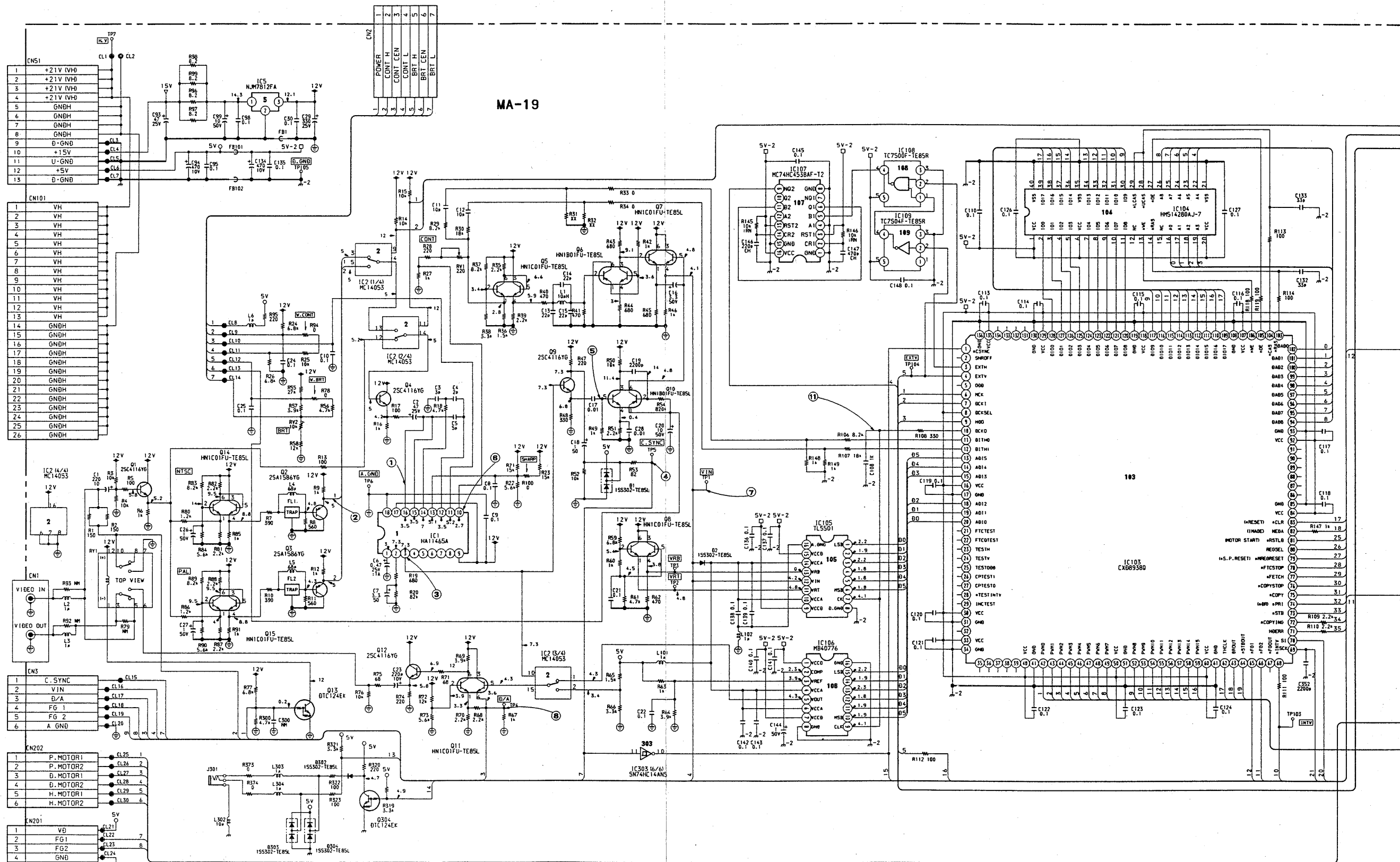
F

G

H

I

MA-19



SECTION 7

ELECTRICAL PARTS LIST

7-1. Parts Information

- **Safety Related Components Warning**
components identified by \triangle marking on the schematic diagrams and repair parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.
- **Replacement Parts** supplied from Sony Parts center will sometimes have a different shape from the original parts.
This is due to “accommodating the improved parts and/or engineering changes” or “standardization of genuine parts” . This manual's repair parts list indicates the parts numbers of “the standardized genuine parts at present” .
Regarding engineering parts changes in our engineering department refer to Sony service bulletins and service manual supplements.
- Items marked “o” in the SP column of the parts list are not stocked since they are seldom required for routine service.
Some delay should be anticipated when ordering these items.
- **Abbreviations**

Ref. No.	Description
C□□, CV□□	CAPACITOR
R□□, RV□□	RESISTOR

- **Units for Capacitors, Inductors and Resistors.**
The following units are assumed in schematic diagrams and repair parts list unless otherwise specified.
Capacitors : μF or pF
Inductors : μH
Resistors : Ω

MA-19 BOARD

Ref. No. or Q'ty	Part No.	Description
1pc	*A-8265-924-B	MOUNTED CIRCUIT BOARD, MA-19
BZ301	1-529-080-11	BUZZER, PIEZOELECTRIC
C1	1-126-923-11	ELECT 220uF 20% 10V
C2	1-104-664-11	ELECT 47uF 20% 25V
C3	1-163-220-11	CERAMIC 3PF 0.25PF 50V
C4	1-162-907-11	CERAMIC, CHIP 2PF 50V
C5	1-162-910-11	CERAMIC 5PF 0.25PF 50V
C6	1-135-145-11	TANTALUM, CHIP 0.47uF 10% 35V
C7	1-126-962-11	ELECT 3.3uF 20% 50V
C8	1-164-156-11	CERAMIC 0.1uF 25V
C9	1-164-156-11	CERAMIC 0.1uF 25V
C10	1-164-156-11	CERAMIC 0.1uF 25V
C11	1-162-915-11	CERAMIC, CHIP 10PF 0.5PF 50V
C12	1-162-915-11	CERAMIC, CHIP 10PF 0.5PF 50V
C13	1-162-919-11	CERAMIC, CHIP 22PF 5% 50V
C14	1-162-919-11	CERAMIC, CHIP 22PF 5% 50V
C15	1-162-919-11	CERAMIC, CHIP 22PF 5% 50V
C16	1-126-962-11	ELECT 3.3uF 20% 50V
C17	1-162-974-11	CERAMIC 0.01uF 50V
C18	1-124-903-11	ELECT 1uF 20% 50V
C19	1-162-966-11	CERAMIC, CHIP 0.0022uF 10% 50V
C20	1-126-964-11	ELECT 10uF 20% 50V
C21	1-164-156-11	CERAMIC 0.1uF 25V
C22	1-164-156-11	CERAMIC 0.1uF 25V
C23	1-126-923-11	ELECT 220uF 20% 10V
C24	1-164-156-11	CERAMIC 0.1uF 25V
C25	1-164-156-11	CERAMIC 0.1uF 25V
C26	1-124-903-11	ELECT 1uF 20% 50V
C27	1-124-903-11	ELECT 1uF 20% 50V
C28	1-162-974-11	CERAMIC 0.01uF 50V
C29	1-126-940-11	ELECT 330uF 20% 25V
C30	1-164-156-11	CERAMIC 0.1uF 25V
C93	1-104-664-11	ELECT 47uF 20% 25V
C94	1-126-925-11	ELECT 470uF 20% 10V
C95	1-164-156-11	CERAMIC 0.1uF 25V
C98	1-164-156-11	CERAMIC 0.1uF 25V
C99	1-126-964-11	ELECT 10uF 20% 50V
C101	1-162-917-11	CERAMIC, CHIP 15PF 5% 50V
C102	1-162-917-11	CERAMIC, CHIP 15PF 5% 50V
C103	1-162-921-11	CERAMIC, CHIP 33PF 5% 50V
C104	1-162-921-11	CERAMIC, CHIP 33PF 5% 50V
C105	1-162-921-11	CERAMIC, CHIP 33PF 5% 50V
C108	1-216-821-11	METAL, CHIP 1K 5% 1/16W
C110	1-164-156-11	CERAMIC 0.1uF 25V
C111	1-104-664-11	ELECT 47uF 20% 25V
C112	1-164-156-11	CERAMIC 0.1uF 25V
C113	1-164-156-11	CERAMIC 0.1uF 25V
C114	1-164-156-11	CERAMIC 0.1uF 25V
C115	1-164-156-11	CERAMIC 0.1uF 25V
C116	1-164-156-11	CERAMIC 0.1uF 25V
C117	1-164-156-11	CERAMIC 0.1uF 25V
C118	1-164-156-11	CERAMIC 0.1uF 25V
C119	1-164-156-11	CERAMIC 0.1uF 25V
C120	1-164-156-11	CERAMIC 0.1uF 25V
C121	1-164-156-11	CERAMIC 0.1uF 25V
C122	1-164-156-11	CERAMIC 0.1uF 25V

(MA-19 BOARD)

Ref. No. or Q'ty	Part No.	Description
C123	1-164-156-11	CERAMIC 0.1uF 25V
C124	1-164-156-11	CERAMIC 0.1uF 25V
C125	1-164-156-11	CERAMIC 0.1uF 25V
C126	1-164-156-11	CERAMIC 0.1uF 25V
C127	1-164-156-11	CERAMIC 0.1uF 25V
C128	1-164-156-11	CERAMIC 0.1uF 25V
C129	1-164-156-11	CERAMIC 0.1uF 25V
C130	1-164-156-11	CERAMIC 0.1uF 25V
C132	1-162-921-11	CERAMIC, CHIP 33PF 5% 50V
C133	1-162-921-11	CERAMIC, CHIP 33PF 5% 50V
C134	1-126-925-11	ELECT 470uF 20% 10V
C135	1-164-156-11	CERAMIC 0.1uF 25V
C136	1-164-156-11	CERAMIC 0.1uF 25V
C137	1-164-156-11	CERAMIC 0.1uF 25V
C138	1-164-156-11	CERAMIC 0.1uF 25V
C139	1-164-156-11	CERAMIC 0.1uF 25V
C140	1-164-156-11	CERAMIC 0.1uF 25V
C141	1-164-156-11	CERAMIC 0.1uF 25V
C142	1-164-156-11	CERAMIC 0.1uF 25V
C143	1-164-156-11	CERAMIC 0.1uF 25V
C144	1-124-903-11	ELECT 1uF 20% 50V
C145	1-164-156-11	CERAMIC 0.1uF 25V
C146	1-162-957-11	CERAMIC 220PF 5% 50V
C147	1-164-315-11	CERAMIC 470PF 5% 50V
C148	1-164-156-11	CERAMIC 0.1uF 25V
C201	1-130-489-00	MYLAR 0.033uF 5% 50V
C202	1-164-156-11	CERAMIC 0.1uF 25V
C203	1-126-964-11	ELECT 10uF 20% 50V
C204	1-164-227-11	CERAMIC 0.022uF 10% 25V
C205	1-126-963-11	ELECT 4.7uF 20% 50V
C206	1-126-964-11	ELECT 10uF 20% 50V
C207	1-126-964-11	ELECT 10uF 20% 50V
C208	1-126-964-11	ELECT 10uF 20% 50V
C209	1-164-156-11	CERAMIC 0.1uF 25V
C210	1-164-156-11	CERAMIC 0.1uF 25V
C211	1-162-966-11	CERAMIC, CHIP 0.0022uF 10% 50V
C212	1-162-966-11	CERAMIC, CHIP 0.0022uF 10% 50V
C301	1-164-227-11	CERAMIC 0.022uF 10% 25V
C302	1-162-970-11	CERAMIC, CHIP 0.01uF 10% 25V
C303	1-104-664-11	ELECT 47uF 20% 25V
C305	1-164-156-11	CERAMIC 0.1uF 25V
C306	1-162-974-11	CERAMIC 0.01uF 50V
C307	1-162-974-11	CERAMIC 0.01uF 50V
C308	1-162-974-11	CERAMIC 0.01uF 50V
C309	1-162-974-11	CERAMIC 0.01uF 50V
C310	1-162-974-11	CERAMIC 0.01uF 50V
C311	1-164-156-11	CERAMIC 0.1uF 25V
C312	1-164-156-11	CERAMIC 0.1uF 25V
C313	1-126-964-11	ELECT 10uF 20% 50V
C314	1-164-156-11	CERAMIC 0.1uF 25V
C315	1-126-964-11	ELECT 10uF 20% 50V
C316	1-164-156-11	CERAMIC 0.1uF 25V
C317	1-164-156-11	CERAMIC 0.1uF 25V
C318	1-104-664-11	ELECT 47uF 20% 25V
C319	1-162-974-11	CERAMIC 0.01uF 50V

(MA-19 BOARD)

Ref. No. or Q'ty	Part No.	Description
C320	1-162-974-11	CERAMIC 0.01uF 50V
C321	1-162-974-11	CERAMIC 0.01uF 50V
C322	1-162-974-11	CERAMIC 0.01uF 50V
C323	1-162-974-11	CERAMIC 0.01uF 50V
C324	1-162-974-11	CERAMIC 0.01uF 50V
C325	1-162-974-11	CERAMIC 0.01uF 50V
C326	1-162-974-11	CERAMIC 0.01uF 50V
C327	1-162-974-11	CERAMIC 0.01uF 50V
C328	1-162-974-11	CERAMIC 0.01uF 50V
C352	1-162-966-11	CERAMIC, CHIP 0.0022uF 10% 50V
CN1	1-691-431-11	CONNECTOR ASSY, BNC
CN2	1-569-536-11	SOCKET, CONNECTOR 7P
CN3	*1-564-005-11	CONNECTOR 6P, MALE
CN101	*1-764-781-11	SOCKET, CONNECTOR 26P
CN102	*1-764-781-11	SOCKET, CONNECTOR 26P
CN201	1-506-469-11	CONNECTOR, 4P, MALE
CN202	1-506-471-11	CONNECTOR, 6P, MALE
CN301	1-562-719-11	SOCKET, CONNECTOR 10P
CN302	1-506-473-11	CONNECTOR, 8P, MALE
CN303	*1-506-468-11	CONNECTOR, 3P, MALE
CN304	1-506-467-11	CONNECTOR, 2P, MALE
CN305	1-506-467-11	CONNECTOR, 2P, MALE
CN306	1-569-536-11	SOCKET, CONNECTOR 7P
CN307	*1-564-004-11	PIN, CONNECTOR 5P
D1	8-719-820-41	DIODE 1SS302
D2	8-719-820-41	DIODE 1SS302
D201	8-719-031-17	DIODE 1SS322-TE85L
D202	8-719-031-17	DIODE 1SS322-TE85L
D301	8-719-820-41	DIODE 1SS302
D302	8-719-820-41	DIODE 1SS302
D303	8-719-820-41	DIODE 1SS302
D304	8-719-820-41	DIODE 1SS302
D305	8-719-820-41	DIODE 1SS302
D306	8-719-820-41	DIODE 1SS302
FB1	1-410-397-21	FERRITE BEAD INDUCTOR 1.1uH
FB101	1-410-397-21	FERRITE BEAD INDUCTOR 1.1uH
FB102	1-410-397-21	FERRITE BEAD INDUCTOR 1.1uH
FL1	1-760-578-11	TRAP, CERAMIC
FL2	1-579-348-11	TRAP, CERAMIC
IC1	8-759-304-10	IC HA11465A
IC2	8-759-300-71	IC MC14053BF
IC5	8-759-231-58	IC TA7812S
IC101	8-759-287-50	IC CXD8932Q
IC102	8-759-925-90	IC SN74HC74ANS
IC103	8-759-292-87	IC CXD8938Q
IC104	8-759-292-88	IC HM514280AJ-7
IC105	8-759-051-50	IC TL5501CDWA
IC106	8-759-051-51	IC MB40776PF
IC107	8-759-008-45	IC MC74HC4538F
IC108	8-759-231-32	IC TC7S00F
IC109	8-759-031-84	IC SC7S04F
IC201	8-759-051-52	IC M51970L
IC202	8-759-600-24	IC M54543L
IC203	8-759-600-24	IC M54543L
IC204	8-759-633-10	IC M54544AL
IC301	8-752-862-49	IC CXP80P116Q-2-279
IC302	8-759-983-69	IC LM358PS
IC303	8-759-925-80	IC SN74HC14ANS

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Ref. No. or Q'ty	Part No.	Description
IC304	8-759-278-46	IC PST600DMT-T1
J301	1-507-967-11	JACK
L1	1-408-777-00	INDUCTOR CHIP 10uH
L2	1-408-765-21	INDUCTOR CHIP 1uH
L3	1-408-765-21	INDUCTOR CHIP 1uH
L4	1-410-391-11	INDUCTOR CHIP 68uH
L5	1-410-391-11	INDUCTOR CHIP 68uH
L6	1-408-765-21	INDUCTOR CHIP 1uH
L101	1-408-765-21	INDUCTOR CHIP 1uH
L102	1-408-765-21	INDUCTOR CHIP 1uH
L301	1-408-777-00	INDUCTOR CHIP 10uH
L302	1-408-777-00	INDUCTOR CHIP 10uH
L303	1-408-765-21	INDUCTOR CHIP 1uH
L304	1-408-765-21	INDUCTOR CHIP 1uH
L305	1-408-765-21	INDUCTOR CHIP 1uH
Q1	8-729-230-63	TRANSISTOR 2SC4116YG
Q2	8-729-230-60	TRANSISTOR 2SA1586YG
Q3	8-729-230-60	TRANSISTOR 2SA1586YG
Q4	8-729-230-63	TRANSISTOR 2SC4116YG
Q5	8-729-427-72	TRANSISTOR HN1C01FU-TE85L
Q6	8-729-427-74	TRANSISTOR XP4601
Q7	8-729-427-72	TRANSISTOR HN1C01FU-TE85L
Q8	8-729-427-72	TRANSISTOR HN1C01FU-TE85L
Q9	8-729-230-63	TRANSISTOR 2SC4116YG
Q10	8-729-427-74	TRANSISTOR XP4601
Q11	8-729-427-72	TRANSISTOR HN1C01FU-TE85L
Q12	8-729-230-63	TRANSISTOR 2SC4116YG
Q13	8-729-901-00	TRANSISTOR DTC124EK
Q14	8-729-427-72	TRANSISTOR HN1C01FU-TE85L
Q15	8-729-427-72	TRANSISTOR HN1C01FU-TE85L
Q201	8-729-901-05	TRANSISTOR DTA124EK
Q202	8-729-901-05	TRANSISTOR DTA124EK
Q203	8-729-427-74	TRANSISTOR XP4601
Q204	8-729-101-07	TRANSISTOR 2SB798
Q205	8-729-140-75	TRANSISTOR 2SD999-CLCK
Q206	8-729-140-75	TRANSISTOR 2SD999-CLCK
Q301	8-729-901-00	TRANSISTOR DTC124EK
Q302	8-729-027-46	TRANSISTOR DTC114YKA-T146
Q303	8-729-230-63	TRANSISTOR 2SC4116YG
Q304	8-729-901-00	TRANSISTOR DTC124EK
R1	1-216-811-11	METAL, CHIP 150 5% 1/16W
R2	1-216-811-11	METAL, CHIP 150 5% 1/16W
R3	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R4	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R5	1-216-809-11	METAL, CHIP 100 5% 1/16W
R6	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R7	1-216-816-11	METAL, CHIP 390 5% 1/16W
R8	1-216-818-11	METAL, CHIP 560 5% 1/16W
R9	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R10	1-216-816-11	METAL, CHIP 390 5% 1/16W
R11	1-216-818-11	METAL, CHIP 560 5% 1/16W
R12	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R13	1-216-809-11	METAL, CHIP 100 5% 1/16W
R14	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R15	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R16	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R17	1-216-809-11	METAL, CHIP 100 5% 1/16W

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Ref. No. or Q'ty	Part No.	Description
R18	1-216-829-11	METAL, CHIP 4.7K 5% 1/16W
R19	1-216-819-11	METAL, CHIP 680 5% 1/16W
R20	1-216-844-11	METAL, CHIP 82K 5% 1/16W
R21	1-216-835-11	METAL, CHIP 15K 5% 1/16W
R22	1-216-830-11	METAL, CHIP 5.6K 5% 1/16W
R23	1-216-835-11	METAL, CHIP 15K 5% 1/16W
R24	1-216-831-11	METAL, CHIP 6.8K 5% 1/16W
R25	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R26	1-216-831-11	METAL, CHIP 6.8K 5% 1/16W
R27	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R28	1-216-813-11	METAL, CHIP 220 5% 1/16W
R29	1-216-832-11	METAL, CHIP 8.2K 5% 1/16W
R30	1-216-836-11	METAL, CHIP 18K 5% 1/16W
R33	1-216-864-11	METAL, CHIP 0 5% 1/16W
R34	1-216-864-11	METAL, CHIP 0 5% 1/16W
R35	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R36	1-216-823-11	METAL, CHIP 1.5K 5% 1/16W
R37	1-216-832-11	METAL, CHIP 8.2K 5% 1/16W
R38	1-216-827-11	METAL, CHIP 3.3K 5% 1/16W
R39	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R40	1-216-817-11	METAL, CHIP 470 5% 1/16W
R41	1-216-817-11	METAL, CHIP 470 5% 1/16W
R42	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R43	1-216-819-11	METAL, CHIP 680 5% 1/16W
R44	1-216-819-11	METAL, CHIP 680 5% 1/16W
R45	1-216-819-11	METAL, CHIP 680 5% 1/16W
R46	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R47	1-216-813-11	METAL, CHIP 220 5% 1/16W
R48	1-216-815-11	METAL, CHIP 330 5% 1/16W
R49	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R50	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R51	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R52	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R53	1-216-808-11	METAL, CHIP 82 5% 1/16W
R54	1-216-856-11	METAL, CHIP 820K 5% 1/16W
R55	1-216-838-11	METAL, CHIP 27K 5% 1/16W
R56	1-216-829-11	METAL, CHIP 4.7K 5% 1/16W
R57	1-216-828-11	METAL, CHIP 3.9K 5% 1/16W
R58	1-216-834-11	METAL, CHIP 12K 5% 1/16W
R59	1-216-831-11	METAL, CHIP 6.8K 5% 1/16W
R60	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R61	1-216-829-11	METAL, CHIP 4.7K 5% 1/16W
R62	1-216-817-11	METAL, CHIP 470 5% 1/16W
R63	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R64	1-216-828-11	METAL, CHIP 3.9K 5% 1/16W
R65	1-216-823-11	METAL, CHIP 1.5K 5% 1/16W
R66	1-216-827-11	METAL, CHIP 3.3K 5% 1/16W
R67	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R68	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R69	1-216-828-11	METAL, CHIP 3.9K 5% 1/16W
R70	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R71	1-216-807-11	METAL, CHIP 68 5% 1/16W
R72	1-216-834-11	METAL, CHIP 12K 5% 1/16W
R73	1-216-830-11	METAL, CHIP 5.6K 5% 1/16W
R74	1-216-813-11	METAL, CHIP 220 5% 1/16W
R75	1-216-807-11	METAL, CHIP 68 5% 1/16W
R76	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R77	1-216-831-11	METAL, CHIP 6.8K 5% 1/16W
R78	1-216-864-11	METAL, CHIP 0 5% 1/16W

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Ref. No. or Q'ty	Part No.	Description
R80	1-216-822-11	METAL, CHIP 1.2K 5% 1/16W
R81	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R82	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R83	1-216-832-11	METAL, CHIP 8.2K 5% 1/16W
R84	1-216-830-11	METAL, CHIP 5.6K 5% 1/16W
R85	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R86	1-216-822-11	METAL, CHIP 1.2K 5% 1/16W
R87	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R88	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R89	1-216-832-11	METAL, CHIP 8.2K 5% 1/16W
R90	1-216-830-11	METAL, CHIP 5.6K 5% 1/16W
R91	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R94	1-216-864-11	METAL, CHIP 0 5% 1/16W
R95	1-216-813-11	METAL, CHIP 220 5% 1/16W
R96	1-216-796-11	METAL, CHIP 8.2 5% 1/16W
R97	1-216-796-11	METAL, CHIP 8.2 5% 1/16W
R98	1-216-796-11	METAL, CHIP 8.2 5% 1/16W
R99	1-216-796-11	METAL, CHIP 8.2 5% 1/16W
R100	1-216-864-11	METAL, CHIP 0 5% 1/16W
R101	1-216-857-11	METAL, CHIP 1M 5% 1/16W
R102	1-216-857-11	METAL, CHIP 1M 5% 1/16W
R103	1-216-803-11	METAL, CHIP 33 5% 1/16W
R104	1-216-803-11	METAL, CHIP 33 5% 1/16W
R105	1-216-803-11	METAL, CHIP 33 5% 1/16W
R106	1-216-832-11	METAL, CHIP 8.2K 5% 1/16W
R107	1-216-836-11	METAL, CHIP 18K 5% 1/16W
R108	1-216-815-11	METAL, CHIP 330 5% 1/16W
R109	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R110	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R111	1-216-809-11	METAL, CHIP 100 5% 1/16W
R112	1-216-809-11	METAL, CHIP 100 5% 1/16W
R113	1-216-809-11	METAL, CHIP 100 5% 1/16W
R114	1-216-809-11	METAL, CHIP 100 5% 1/16W
R115	1-216-864-11	METAL, CHIP 0 5% 1/16W
R117	1-216-864-11	METAL, CHIP 0 5% 1/16W
R118	1-216-809-11	METAL, CHIP 100 5% 1/16W
R119	1-216-809-11	METAL, CHIP 100 5% 1/16W
R121	1-216-864-11	METAL, CHIP 0 5% 1/16W
R122	1-216-864-11	METAL, CHIP 0 5% 1/16W
R125	1-216-809-11	METAL, CHIP 100 5% 1/16W
R126	1-216-809-11	METAL, CHIP 100 5% 1/16W
R127	1-216-809-11	METAL, CHIP 100 5% 1/16W
R128	1-216-809-11	METAL, CHIP 100 5% 1/16W
R129	1-216-809-11	METAL, CHIP 100 5% 1/16W
R130	1-216-809-11	METAL, CHIP 100 5% 1/16W
R131	1-216-809-11	METAL, CHIP 100 5% 1/16W
R132	1-216-809-11	METAL, CHIP 100 5% 1/16W
R133	1-216-809-11	METAL, CHIP 100 5% 1/16W
R134	1-216-809-11	METAL, CHIP 100 5% 1/16W
R135	1-216-809-11	METAL, CHIP 100 5% 1/16W
R136	1-216-809-11	METAL, CHIP 100 5% 1/16W
R137	1-216-809-11	METAL, CHIP 100 5% 1/16W
R138	1-216-809-11	METAL, CHIP 100 5% 1/16W
R139	1-216-809-11	METAL, CHIP 100 5% 1/16W
R140	1-216-809-11	METAL, CHIP 100 5% 1/16W
R141	1-216-809-11	METAL, CHIP 100 5% 1/16W
R142	1-216-809-11	METAL, CHIP 100 5% 1/16W
R143	1-216-809-11	METAL, CHIP 100 5% 1/16W
R144	1-216-809-11	METAL, CHIP 100 5% 1/16W

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Ref. No. or Q'ty	Part No.	Description
R145	1-218-716-11	METAL, 10K 0.50% 1/16W
R146	1-218-716-11	METAL, 10K 0.50% 1/16W
R147	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R148	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R149	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R201	1-216-846-11	METAL, CHIP 120K 5% 1/16W
R202	1-216-842-11	METAL, CHIP 56K 5% 1/16W
R203	1-216-837-11	METAL, CHIP 22K 5% 1/16W
R204	1-216-809-11	METAL, CHIP 100 5% 1/16W
R205	1-216-843-11	METAL, CHIP 68K 5% 1/16W
R206	1-216-813-11	METAL, CHIP 220 5% 1/16W
R207	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R208	1-216-825-11	METAL, CHIP 2.2K 5% 1/16W
R210	1-216-864-11	METAL, CHIP 0 5% 1/16W
R211	1-216-817-11	METAL, CHIP 470 5% 1/16W
R212	1-216-793-11	METAL, 4.7 5% 1/16W
R213	1-216-793-11	METAL, 4.7 5% 1/16W
R214	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R215	1-216-824-11	METAL, CHIP 1.8K 5% 1/16W
R216	1-216-827-11	METAL, CHIP 3.3K 5% 1/16W
R217	1-216-829-11	METAL, CHIP 4.7K 5% 1/16W
R218	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R219	1-216-834-11	METAL, CHIP 12K 5% 1/16W
R220	1-216-831-11	METAL, CHIP 6.8K 5% 1/16W
R221	1-216-797-11	METAL, CHIP 10 5% 1/16W
R222	1-216-797-11	METAL, CHIP 10 5% 1/16W
R223	1-216-797-11	METAL, CHIP 10 5% 1/16W
R224	1-216-797-11	METAL, CHIP 10 5% 1/16W
R225	1-216-816-11	METAL, CHIP 390 5% 1/16W
R226	1-216-816-11	METAL, CHIP 390 5% 1/16W
R227	1-216-864-11	METAL, CHIP 0 5% 1/16W
R228	1-216-809-11	METAL, CHIP 100 5% 1/16W
R229	1-216-809-11	METAL, CHIP 100 5% 1/16W
R230	1-216-857-11	METAL, CHIP 1M 5% 1/16W
R231	1-216-857-11	METAL, CHIP 1M 5% 1/16W
R300	1-216-829-11	METAL, CHIP 4.7K 5% 1/16W
R301	1-216-827-11	METAL, CHIP 3.3K 5% 1/16W
R302	1-216-815-11	METAL, CHIP 330 5% 1/16W
R303	1-216-815-11	METAL, CHIP 330 5% 1/16W
R304	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R305	1-216-808-11	METAL, CHIP 82 5% 1/16W
R306	1-216-847-11	METAL, CHIP 150K 5% 1/16W
R307	1-216-835-11	METAL, CHIP 15K 5% 1/16W
R308	1-216-837-11	METAL, CHIP 22K 5% 1/16W
R309	1-216-845-11	METAL, CHIP 100K 5% 1/16W
R310	1-216-828-11	METAL, CHIP 3.9K 5% 1/16W
R311	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R312	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R313	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R314	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R315	1-216-815-11	METAL, CHIP 330 5% 1/16W
R316	1-216-837-11	METAL, CHIP 22K 5% 1/16W
R317	1-216-827-11	METAL, CHIP 3.3K 5% 1/16W
R318	1-216-827-11	METAL, CHIP 3.3K 5% 1/16W
R319	1-216-827-11	METAL, CHIP 3.3K 5% 1/16W
R320	1-216-813-11	METAL, CHIP 220 5% 1/16W
R321	1-216-827-11	METAL, CHIP 3.3K 5% 1/16W
R322	1-216-809-11	METAL, CHIP 100 5% 1/16W
R323	1-216-809-11	METAL, CHIP 100 5% 1/16W

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Ref. No. or Q'ty	Part No.	Description
R324	1-216-817-11	METAL, CHIP 470 5% 1/16W
R325	1-216-824-11	METAL, CHIP 1.8K 5% 1/16W
R326	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R327	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R328	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R329	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R330	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R331	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R332	1-216-845-11	METAL, CHIP 100K 5% 1/16W
R333	1-216-845-11	METAL, CHIP 100K 5% 1/16W
R334	1-216-845-11	METAL, CHIP 100K 5% 1/16W
R335	1-216-845-11	METAL, CHIP 100K 5% 1/16W
R336	1-216-845-11	METAL, CHIP 100K 5% 1/16W
R337	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R338	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R339	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R340	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R342	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R343	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R344	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R345	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R346	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R347	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R348	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R349	1-216-842-01	RESISTOR, CHIP 56K 1/16W (1608)
R350	1-216-842-01	RESISTOR, CHIP 56K 1/16W (1608)
R351	1-216-842-01	RESISTOR, CHIP 56K 1/16W (1608)
R352	1-216-842-01	RESISTOR, CHIP 56K 1/16W (1608)
R353	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R354	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R355	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R356	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R357	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R358	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R359	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R360	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R361	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R362	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R363	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R364	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R365	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R366	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R367	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R368	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R369	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R370	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R371	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R372	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R373	1-216-295-91	METAL, CHIP 0 5% 1/10W
R374	1-216-295-91	METAL, CHIP 0 5% 1/10W
R375	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R376	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R377	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R378	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R379	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R380	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R381	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R382	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R383	1-216-833-11	METAL, CHIP 10K 5% 1/16W

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Ref. No. or Q'ty	Part No.	Description
R384	1-216-846-11	METAL, CHIP 120K 5% 1/16W
R385	1-216-847-11	METAL, CHIP 150K 5% 1/16W
R386	1-216-845-11	METAL, CHIP 100K 5% 1/16W
R387	1-216-841-11	METAL, CHIP 47K 5% 1/16W
R388	1-216-838-11	METAL, CHIP 27K 5% 1/16W
R389	1-216-821-11	METAL, CHIP 1K 5% 1/16W
R390	1-216-864-11	METAL, CHIP 0 5% 1/16W
R391	1-216-864-11	METAL, CHIP 0 5% 1/16W
R392	1-216-829-11	METAL, CHIP 4.7K 5% 1/16W
R393	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R394	1-216-833-11	METAL, CHIP 10K 5% 1/16W
R395	1-216-864-11	METAL, CHIP 0 5% 1/16W
R396	1-216-821-11	METAL, CHIP 1K 5% 1/16W
RV1	1-241-175-11	RES, ADJ, INDIVIDUAL METAL 220
RV2	1-238-090-11	RES, ADJ, 10K
RV201	1-241-092-11	RES, ADJ, INDIVIDUAL METAL 47K
RY1	1-515-614-11	RELAY
S301	1-572-999-11	SWITCH, SLIDE
S302	1-762-299-11	SWITCH, DIP (PIANO TYPE)
S303	1-572-999-11	SWITCH, SLIDE
X101	1-760-094-11	RESONATORVIBRATOR, CRYSTAL
X301	1-579-125-11	RESONATOR, CERAMIC